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ABSTRACT

In times of relatively full employment, manpower policy has been directed generally toward alleviating the difficulties of unskilled labor. Now, however, there is noticeable unemployment among professionals that has caused attention to focus on the uncertain channels between the training and employment of skilled manpower. This document is a study of these channels and fulfills 5 major objectives: (1) to ascertain the scope and significance of new academic programs planned through 1975 by institutions of higher education in Connecticut; (2) to identify higher educational output in specific disciplines; (3) to identify existing manpower projections that may be correlated to higher educational output; (4) to review institutions' earlier predictions of academic programs and the degree to which they were realized or sustained; and (5) to determine areas in which significant unfulfilled manpower needs do or will exist. (Author/HS)

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STUDENT INTERNSHIPS IN ECONOMIC DEVELOPMENT PROGRAMS

1971

CONNECTICUT'S ACADEMIC PROGRAMS IN HIGHER EDUCATION AND THEIR RELATIONSHIPS TO SELECTED MANPOWER PROJECTIONS

Connecticut Commission for Higher Education

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Foreword

This report represents the work of a student or students in the New England Board of Higher Education's (NEBHE) Student Internship in Economic Development (SIED) program. The objective of this program is to relate the resources of institutions of higher education to economic development organizations in such a way as to:

- o assist economic development organizations in the investigation and solution of selected, well-defined problems through the use of student manpower; and
- o permit students to enrich their formal learning through concrete service experience in economic development.

This program thus represents one component of NEBHE's continuing effort to assist the New England State governments and the public and private institutions of higher education in their effort to expand the quantity and quality of educational opportunity. The New England Board of Higher Education was created in 1955 by a six-state compact and ratified by Congress. It is thus the official regional agency of these states for this purpose and related functions.

Major financial support for the Student Internship in Economic Development program came from the New England Regional Commission (NERCOM).

The findings, conclusions and recommendations contained herein are those of the author(s) and do not necessarily represent those of the local organizations, participating universities, NERCOM, NEBHE or the SIED staff. They are in effect, the students' contribution to the continuing processes of economic and social growth in the New England region.

STATE OF CONNECTICUT

COMMISSION FOR HIGHER EDUCATION

P.O. Box 1320 - Hartford, Connecticut 06101

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TO ALL CONCERNED:

The Connecticut Commission for Higher Education is pleased to receive the attached report by Gary S. Jacobson and Steven A. Torok, CONNECTICUT'S ACADEMIC PROGRAMS IN HIGHER EDUCATION AND THEIR RELATIONSHIP TO SELECTED MANPOWER PROJECTIONS. The authors, students at Wesleyan University, developed this report during the summer of 1971 under a grant by the New England Board of Higher Education's Student Internships in Economic Development, a program directed by Mr. Norman Stein. Professor Jon Joyce of the Department of Economics at Wesleyan served as faculty advisor for the project.

The report will be very useful to the Commission for Higher Education in its responsibility for planning and coordination of planning in higher education, as well as to the colleges and universities in Connecticut as they seek to increase effectiveness in planning programs to satisfy evolving needs in higher education. The report should also be useful to other agencies and individuals in Connecticut in their planning efforts, as well as to comparable agencies and groups in other states.

Some useful outcomes of the report are the following:

1. An analysis of the projections of academic programs made by individual institutions of higher learning in Connecticut through 1975. Some limits in projections are also noted.

2. Examples of conclusions regarding projections of supply and demand of manpower in certain selected fields. It is important for the reader to note, with regard to this point, that such manpower projections are not taken to mean firm, accurate conclusions, but rather examples of conclusions, that would be made by following processes of projections described by the authors.

3. Extensive, though preliminary, investigation of the possibility of developing matrices and interfaces between the projections in the economic/manpower field vis-a-vis the projections in the academic community.

The Commission for Higher Education is grateful to the New England Board of Higher Education and to the authors for the important service which has been performed through this very valuable study.

Sincerely yours,

Louis Rabineau

Louis Rabineau, Deputy Director and
Associate Director for Program Planning

LR/ebs

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CHAPTER I

Introduction

This study of manpower supply and demand attempts to relate higher education and the job market--two realms of society that have rarely have been held accountable to one another. In times of relatively full employment, manpower policy has been directed generally toward alleviating the difficulties of unskilled labor and toward minimizing the transitional and structural unemployment which maintains an unemployment rate of about four percent even in the firmest economy. However, the recent pheonomenon of noticeable unemployment among professionals has been focused attention on the uncertain channels between the training and employment of skilled manpower. Defining and exploring these channels is the purpose of this study.

In the opinion of some, relating higher education and the job market tarnishes the philosophical basis of a liberal arts education as an intangible good contributing to the individual's spiritual and moral development. Additionally, manpower planning as an instrument of public policy also appears to some as an impingement on individual freedom and free will. A statement of the Commission on Human Resources and Advanced Education provides, we think, a good perspective from which to consider a study of this type:

> The Commission's approach has been to examine the system from the outside, from the point of view of society rather than that of the individual, from the point of view represented by such terms as manpower, supply and

> demand, shortage, surplus, utilization of supply, or adjustment of supply and demand, rather than from the view point of an individual making his own individual decisions. Some people object to such terms as manpower or the output of an educational institution as demeaning to the individual human beings involved. The humane concerns represented by the objections must be respected, but in dealing with professional and specialized persons en masse, such terms are descriptive and convenient. They will be used without apology, for they imply no disregard for the rights and sensibilities of individuals.

Thus, we view knowledge illuminating the relationships between higher education and the job market as useful for formulation of a coherent manpower policy on the national, regional, and State levels. Moreover, any knowledge which will facilitate a more efficient utilization of scarce educational resources can only benefit the society that assembles and supports such resources. The information which eventually may be disseminated from studies of this type will also be of great value to individuals for purposes of guidance and placement.

Because this study employs a number of economic concepts, it is important to note that the limited scope and depth of this study somewhat restricts the full meaning of such concepts as "supply and demand". Albert M. Levenson, in an unpublished preface to Manpower Supply and Demand in Nassau-Suffolk 1965-1975,adequately defines the special case:

> Projecting supply and demand in a labor market is inherently difficult because of the complex interdependencies in such a market, which is in a continuous process of dynamic adjustment to changing conditions. Our estimates are essentially static, being based largely upon data which is at best available at discrete intervals. We, of course, make every effort to account for change but if we project forward current trends and relationships and uncover apparent supply-demand mismatches, this does not mean that these projected disequilibria will, in fact, obtain when the projection horizon is reached. If, for instance, an excess of demand over supply is foreseen for a particular

> type of labor, this implies a rise in the relative wage for this labor. This rise in the relative wage will encourage employers to substitute cheaper labor for the more expensive labor and if this is not possible, to substitute capital for labor by shifting to labor-saving methods of production. In addition, there will be a tendency for buyers to substitute relatively cheaper products for ones whose labor costs and hence prices have risen. If the wage rate for this labor has risen above that for comparable labor in other areas and adjustments within the local market do not equalize the difference in remuneration, workers will be encouraged to in-migrate and this will also help to equilibrate supply and demand for labor.

Throughout this report lies a conceptual dilemna inherent in relating higher education and the occupational spectrum. The education occupation interface developed in this report consists of flows and relationships which seem logical and rational. It is reasonable to assume that a firm channel exists between medical training and medical professions, for example. The number of such "logical" channels, however, is severely limited, as is their application to the actual careers of graduates of a given degree program. With our strong concluding recommendation for an empirically-derived matrix in mind, kindly bear with what generalizations inevitably appear in this study.

Although a perusal of this report may reveal its various chapters as somehwat disjointed, we feel that each chapter represents a vital element in an assessment of supply and demand for higher education manpower in Connecticut. Further, the variety of information presented in this study should provide a methodological guide for future studies of this nature. It should be noted that the various lengths of chapters reflect the amount of information available on each given topic and are not an indication of any relative importance of the subject matter.

In a project of this nature, the assistance of numerous individuals is required. A list of our interviews with resource persons is included as an appendix to this study, and we thank the interviewees for their time and cooperation. Appreciation is also due to Mr. Horace Brown, Director of the Office of State Planning for his role in guiding the direction of the internship project. Virginia Gilmore, Government Documents Librarian at the Connecticut State Library, was most patient in providing information and in alerting us to new sources of data. The Wilbur Cross Library of the University of Connecticut and Olin Library of Wesleyan University were most cooperative. Various officials in State agencies and the Bureau of Labor Statistics clarified problems over the telephone, as did various academicians throughout the nation.

Our deepest appreciation is due to Norman Stein, Director of the Student Internships in Economic Development, and to the entire New England Board for Higher Education for sponsoring this project and publishing its results. We are grateful to the New England Regional Commission for funding what appears to be a fruitful investment in merging the academic and practicing realms of economics and government. The funding of studies such as ours on a regional or state-wide basis is, we feel, the route toward worthwhile information for non-federal policy development as well as for the development of research methodologies.

On a more personal basis, we wish to thank William J. Barber, Chairman of the Economics Department at Wesleyan University, for his efforts in securing our appointments as student interns. Professor Jon Joyce of Wesleyan, faculty advisor to the internship project, provided unerring guidance and the necessary inconoclasm and reassurance at the appropriate time.

We express our greatest gratitude to Chancellor Warren G. Hill and the entire professional and secretarial staffs of the Commission for Higher Education. Dr. Louis Rabineau, Deputy Director, coordinated the internship with both insight and finesse. But the entire staff went to great lengths to provide information and assistance whenever needed, as well as including us fully in professional activites. The competent and convivial atmosphere of the CHE made pleasant what might have been a tedious summer.

Our heart-felt thanks go to David Jay Weber for his voluntary eleventh-hour editorial assistance, and to Kathy Carlin, Karen Kaplan and Cheryl Venora of the CHE for performing the bulk of the unenviable task of typing this report.

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September, 1971

CHAPTER II

OBJECTIVES OF PROJECT

The title of this report, "Connecticut's Academic Programs in Higher Education and their Relationships to Selected Manpower Projections," was chosen with the intent of indicating the modest ambitions of this project. The specific objectives of the project submitted to NEBHE attempted to circumscribe the many possible approaches to the issue of manpower supply and demand. Five goals were outlined:

1. To ascertain the scope and significance of new academic programs planned through 1975 by institutions of higher education in Connecticut.

2. To identify higher educational output in specific disciplines.

3. To identify existing manpower projections that may be correlated to higher educational output.

4. To review institutions' earlier predictions of academic programs and the degree to which they were realized or sustained.

5. To determine areas in which significant unfulfilled manpower needs do or will exist.

Goal #1 has been met via the analysis of "Memorandum 10" which may be found in Chapter VIII. Goal #2 and Goal #3 have been approached as far as possible in Chapters IV and V, although the necessity of working with data aggregated to varying degrees hampered progress. Goal #4 has been realized in a subsection of Chapter VIII where a follow-up of institutions' 1967 academic plans may be found. An approximation of Goal #5 may be found in the Conclusions (Chapter VI), where Connecticut data on

graduates in certain academic areas and demand for certain occupations has been matched, indicating areas of possible manpower unbalance in 1975 and 1980. Additional chapters represent digressions from the five goals, and serve to evaluate alternate sources of information and to illuminate possible areas of future inquiry.

CHAPTER III

MATRICES AND INTERFACES

At the heart of this analysis is the supposition that supply and demand of educated manpower can be related on the basis of some type of interface or matrix. This section attempts to review the general characteristics of such a matrix. It also reviews the various sources of data input which are available for both the supply and demand side of the relationship. Finally, this section will discuss the uses, limitations, and prospects for further development of the interface.

The primary difficulty with applying supply and demand analysis to higher education and to occupational categories is that the analytical matrix which needs to be constructed represents a totally unique body of relationships. What is needed to carry the analysis to anything beyond a superficial level is nothing less than a matrix which would show the entire spectrum of academic programs offered by institutions of higher education and the entire array of occupations which require as practioners individuals trained through some academic program of higher education. In addition to these sweeping systems of classification, one needs to diagram the often elaborate set of interrelationships which exist between the two separate bodies of classified data. A comprehensive analysis of the two data sets is the key to the usefulness of the matrix.

As indicated in the Introduction to this volume, wage and price changes are generally neglected throughout this analysis. The changes are the inevitable result of supply and demand discrepancies and occur to some degree

in the short run as well as the long run. Although economic techniques exist for predicting the occurrence of such induced wage and price changes, they are not considered in this disucssion for the sake of computational simplicity.

It should be noted that even a partial interfacing of the two data pools requires a comprehensive listing of both academic programs and occupational groups. A less than comprehensive inventory on either side of the matrix runs the risk of either leaving out academic programs which feed into a given occupational category, or not accounting for all occupational possibilities for a given academic program. The result of such disparities would be to either understate the supply if dealing with an incomplete academic program listing or to understate the demand if dealing with the incomplete occupational listing. This necessity for comprehensiveness does not necessarily signify that all occupations have inputs from all academic programs and vice versa, but rather that many separate demand categories often have more than one corresponding supply category and vice versa. Thus, even though a given flow will use only a limited number of matrix channels, the full range of these channels will not be revealed in most cases unless the entire matrix has been developed.

The matrix, once established, can be employed with less than complete sets of data. All that is needed in order to generate a valid conclusion is a given data input adjusted to correspond to the definitional characteristics of the appropriate side of the matrix. Utilization of the complete matrix will demonstrate how the given data input influences the various other categories on the other side of the matrix. For example, a given supply input may feed five separate demand categories to varying

extents. The extent to which the supply data is proportioned out can be derived through the complete matrix by utilizing a figure indicating the marginal propensity to absorb new entrants of each of the five demand categories. The entrants in the five demand categories will, of course, equal the total number of entrants and will reflect their apportionment.

Thus, the complete matrix must contain two sets of relationships. One set is a simple qualitative cross-reference breakdown - an interface - which would reflect the effect an input from either side of the matrix. For some inputs this is a relatively simple task. For example, an input of an academic program in engineering has corresponding demands essentially only in areas involving engineering. Viewed from the demand side, a demand for chemical engineers has a supply once again only in a few academic areas, primarily chemistry and engineering. Other relationships are considerably more complex. The range of occupation demands for an academic program such as English is enormous. Conversely, demands of an area such as journalism feed upon a host of academic supply areas ranging across - and beyond - the whole spectrum of the liberal arts.

The second set of relationships consists of a complete index of marginal propensities to correspond to all of the matrix channels mentioned previously. Ideally, such a matrix would include a marginal propensity for every cell created by the education and occupation axis. These statistical constants are essential if one is to be able to utilize the matrix or anything other than a general aggregation or reference. Obviously, such an accumulation of data would require an extraordinary research undertaking. The very nature of the relationships involved ensures these propensities

are the result of highly complex factors. In a simple form these propensities are obtainable by utilizing surveys of the historical tendencies of students to leave given academic programs and enter give occupations. Such data, however, have a strong element of ceteris paribus ("all other factors being considered as equal") built into them. When dealing with small changes over a short run period it may be perfectly acceptable to neglect this point without generating serious distortions. However, over the long run and if dealing in large changes one will find that in many cases ceteris paribus does not hold true.

If the matrix is to have a useful purpose other than as simply a statistical device, it must have built into it the necessary co-variant functions which will allow it to account for the changes which it internally generates. Without these co-variants, projections generated by the matrix are valid only insofar as (a) the academic program mix remains constant, (b) the composition of the labor market maintains its initial proportions, and (c) long-run structural changes in the supply/demand relationship are not generated by various supply/demand disequilibria. Such fundamental changes are quite likely, however. The inclusion of co-variant factors and periodic re-sampling will ensure that matrix is valid for both on-line monitoring and for projecting.

Consider, for example, that the nation were to drastically increase the graduates of a given academic area as if in answer to a demand which manifests itself somewhere in the occupational mix. Among the effects of this change might be the elimination of movement into that occupational area from a second academic area. The effect of this would be not only to alter the distribution ratios of the second academic area but also to

possibly create a surplus which in turn will create disequilibrium and so on until the change had rippled through the entire matrix, adjusting propensities it went. Again, the implication is that if the matrix is to be of any value as a major apparatus for determining policy, it must have incorporated into it the necessary structure to adjust to exogenous and endogenous changes.

Such then are the complexities and capabilities a completed matrix would have. No such matrix exists at this point in time, however. Indeed the existing data allows for the most part only very aggregative classification of academic programs and occupational opportunities. These classification systems (which represent the core of a matrix and the interrelationships between them) comprise the remainder of this chapter.

For a classification system to be useful in the manners outlined previously, it must possess certain essential characteristics. First, the system must be comprehensive. It must in some manner account for all the subject material within its broadest sphere of application; e.g., an occupational matrix must account for <u>all</u> occupations which conceivably could utilize highly educated manpower. This requirement would necessitate in itself a complete review of all occupations to determine whether or not they may require entrants possessing higher education. Secondly, the system must be flexible. The system must be able to account not only for all existing entries but it must be able to also accept all new entries which in time may appear. This ability to accept without the necessity of a total rewriting is vital to the continuity of the matrix system.

The conditions outlined above are basic to any usable system of classification. In addition, certain other characteristics would be highly

desirable for purposes of facilitating the implementation of an education/occupation matrix. First and foremost, the classification systems should be widely accepted and standard in format. It is extremely helpful to be able to refer to a system with which individuals have been familiar for some time and about which there is minimal confusion in terminology. This standardization is especially helpful in developing new surveys which will require participation of individuals who have had no previous experience with supply/demand analysis. Secondly, it would be helpful if the system of classification were so constructed as to facilitate translation of alternative classification systems into it.

In an occupation/education matrix two separate systems of classification are involved, one for educational programs and one for occupations. At present there are available in the United States for each side of the relationship two alternative systems which possess enough of the previously stated characteristics to be useful in the construction of the matrix.

With regard first to a system of occupational classification there is presently in existence an extremely comprehensive Federal document entitled the Dictionary of Occupational Titles (hereafter referred to as the "D.O.T.".) The most recent available D.O.T. is the third edition, published in 1965. At present the D.O.T. consists of three volumes: Volume I consists of a complete set of definitions for the various occupational titles; Volume II consists of a complete listing of occupational classifications; and the third volume is basically a supplement to the first two and is combined with periodic revisions, which have been fairly minimal.

The D.O.T. is purported to be a complete inventory of all occupations within the U.S. economy. As such it fulfills the first requirement of being

a comprehensive listing. Indeed, the difficulty in using the D.O.T. is that it is perhaps too comprehensive; for deriving the several thousand entries of most concern requires sifting through approximately 75,000 other entries.

Fortunately, the problem has been considerably simplified by the unique classification system employed by the D.O.T. Within the D.O.T. every occupation has a six-digit classification number. These six digits are really two three-digit systems. The first three digits place occupations into large groups of similar endeavors. The last three digits are not so much further classification as they are descriptive. Within the second three digits, each digit independently refers back to a central scale designed to measure how the given occupation relates to one of three reference categories: data, people, and things. Additionally, the D.O.T. provides a complete breakdown of occupations by areas of work. Within the division of workareas, subdivisions are made in terms of worker trait groups. For example, the work area of Art divides into the following worker trait groups:

- Instructive Work, Fine Arts, Theater, Music and Related Fields;
- Decorating and Art Work;
- Photography and Motion Picture Work;
- Art Work;
- Artistic Restoration, Decoration, and Related Work

For each of these subdivisions descriptive profiles are provided, and are based on scales of training time (subdivided into general educational

development and specific vocational preparation), aptitudes, interests, temperaments, physical demands and working conditions.

An initial review of the D.O.T. reveals a potential structure for creating an inventory of occupations relating to specific academic prerequisites. The difficulty, as mentioned before, is determining the spectrum of occupations which require higher-educated manpower. Depending on the level of sophisticaton one seeks to obtain in the interface, the D.O.T. listings can be very helpful.

The range of occupations which draw upon higher-educated manpower can be found within one limited section of the D.O.T. three-digit listing. This section is entitled, "Professional, Technical, and Managerial Occupations" (professional, technical and managerial work)[1], and ranges from D.O.T. three-digit number 001 to 199. The full listing of these occupational categories may be found in Appendix A of this chapter. Seeking a further breakdown which would relate more specifically to occupations and educational prerequisites, one could utilize the D.O.T.'s second three-digit listing system or its breakdown of occupations on the basis of worker traits. One of the worker traits is educational development and several are akin to indices of higher education.

Just how necessary an extremely fine line listing of occupations would be is questionable, however. Such a listing including the whole spectrum of the D.O.T. six-digit occupations might be necessary in order to coordinate demand statistics which may be broken down to fine line listings and to ensure that demand is completely aggregated. Yet, it is doubtful whether there is any point in trying to originate matrix channels from an occupation listing finer than three-digits. An example of a primary three-digit listing

would be the following entry:

051. Occupations in Political Science

This group includes occupations concerned with research in the origin, development and organization of formal and informal political entities. Includes developing the theories based on research data; and making recommendations for the solution of problems in such fields as organization and administration of national and local government, international organizations and relations, governments, all policies in foreign and domestic matters and relations between governments and special interest groups.

In view of the nature of present education statistics (to be discussed below) it seems pointless to base occupational data on a category breakdown any more specialized than the one cited above. In addition to practical constraints, the argument can be advanced that greater refinement may result in illusory accuracy. It would be of little use to measure the graduates of urban sociology programs if the graduate himself does not feel constrained to enter that narrow field. Indeed, past evidence tends to indicate that while economics majors do in fact tend to work in economics, it is usually coincidental if their occupation corresponds exactly to the specific emphasis of their particular education. There is, in other words, a point of specification beyond which further detailed breakdowns are meaningless from this supply/demand perspective. (A summary of the criteria on which the last three D.O.T. digits are based is included as Appendix B to this chapter. A summary of worker trait scales is also included.)

There does exist a classification system alternative to the D.O.T.; namely, the set of occupation titles composed by the Bureau of Census. The Census Bureau titles are nearly as complete as the D.O.T., but lack the

organizational advantages of the D.O.T. The prime advantage possessed by the Census system is that a great number of demand studies have been based on that system of analysis. A full conversion table between Census and D.O.T. title have been prepared by the U.S. Department of Labor.[2] Through utilization of this table, one can make statistics gathered by different surveys equivalent. It should be noted, however, that at the three-digit level there seems to be only minimal disagreement between the two systems. It is unfortunate that two Federal agencies attempting to gather the same type of material and to answer to the similar questions have not been able to agree on one common set of definitions. Competing schemes at the Federal level have affected State data in the same manner. Often states seem to have resorted to using their own systems of classification rather than facing the confusing Federal array.

The D.O.T. is far from a perfect system. Within the list of three-digit occupations referred to, many are not directly served by higher-educated manpower. Additionally, the system often hinders the use of aggregations in the interfacing of occupations and educational programs. However, the D.O.T.'s key advantages remain -- the system is comprehensive, established, and reasonably predisposed to being related to academic program listings.

In the area of academic program listings, a different variety of problems are encountered. Within the colleges and universities the concept of monitoring output by degree area is relatively new. Apparatus for measuring this output is either in development or exists unutilized. There is, however, one uniform survey conducted by the U.S. Office of Education and aimed at measuring the output of colleges and universities on an aggregated basis. The survey of degrees conferred conducted annually as a part of the Higher

Education General Information Survey (HEGIS) requests all colleges and universities to report the total number of degrees conferred within a listing of program areas.

The HEGIS survey lists 24 general program areas at the Bachelor's degree and above level and seven designed to measure Associate degree output. These 31 categories may be termed the HEGIS two-digit listings. Within each two-digit listings there are a number of four-digit subprograms listed. For example, the program area of Computer and Information Sciences (or) contains four digit lines listings the following entries:

Computer and Information Sciences, General (0701)	Computer Programming (0704)
Information Sciences and Systems (0702)	Systems Analysis (0705)
Data Processing (0703)	Other, Specific (0799)

Although generally information in Connecticut is only available on the basis of the 31 general area listings it would be a relatively easy data retrieval operation to pull out the totals by individual four-digit listings. Such data would tend to equal the level of specification present in D.O.T. three-digit listings. The type of data being dealt with and the format of the HEGIS questionnaire makes virtually impossible the creation of categories equivalent to D.O.T. six-digit listings. However, as has been indicated previously, such a specification of data is not necessarily more useful and may indeed be misleading. A basic listing of the 31 academic programs measured within the HEGIS survey is included as Appendix C to this chapter.

The HEGIS taxonomy referred to above is in itself a new system. It is the outgrowth of early systems which were somewhat less comprehensive

or lacked the flexibility deemed desirable to account for additional disciplines. Although the system of classification has been changing it is important to note that the change can be accounted for simply by utilizing the correct translation schemes. In this way the HEGIS system, like that of the D.O.T., can be used to generate a substantial body of historical data.

Throughout this report various charts representing either sections of the educational supply or parts of the occupational demand are included, usually illustrating how particular derivation of supply and demand aggregations. For the most part, the source of educational statistics has been summaries of various HEGIS questionnaires. Demand statistics have been derived from a variety of sources, most of which are based upon D.O.T. titles or Census classifications. Where necessary, reference is made to the system of classification and the translation scheme employed.

NOTES FOR CHAPTER III.

[1]Dictionary of Occupational Titles, 1965, V.II, p.3.

[2]Conversion Table: Bureau of the Census - Dictionary of Occupational Titles, 1970.

APPENDIX III-A

THREE-DIGIT OCCUPATIONAL GROUPS

PROFESSIONAL, TECHNICAL, AND MANAGERIAL OCCUPATIONS (PROFESSIONAL, TECHNICAL, AND MANAGERIAL WORK)*

00 Occupations in Architecture and Engineering
01 (Architecture and Engineering)

001. Architectural occupations
(Architecture)
002. Aeronautical engineering occupations
(Aeronautical engineering)
003. Electrical engineering occupations
(Electrical engineering)
005. Civil engineering occupations
(Civil engineering)
006. Ceramic engineering occupations
(Ceramic engineering)
007. Mechanical engineering occupations
(Mechanical engineering)
008. Chemical engineering occupations
(Chemical engineering)
010. Mining and petroleum engineering occupations
(Mining and petroleum engineering)
011. Metallurgy and metallurgical engineering occupations
(Metallurgy and metallurgical engineering)
012. Industrial engineering occupations
(Industrial engineering)
013. Agricultural engineering occupations
(Agricultural engineering)
014. Marine engineering occupations
(Marine engineering)
015. Nuclear engineering occupations
(Nuclear engineering)
017. Draftsmen, n.e.c.
(Drafting and related work)
018. Surveyors,n.e.c.
(Surveying and related work)
019. Occupations in architecture and engineering, n.e.c.
(Architecture and engineering, n.e.c.)

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*Note: The designations in parentheses are restatements of the names of the categories, division, and 3-digit groups of the Occupational Group Arrangement of Titles and Codes. They are used in the Worker Traits Arrangement of Titles and Codes to designate the occupational categories, divisions, and 3-digit groups as they appear within worker trait groups.

02 Occupations in Mathematics and Physical Sciences
(Mathematics and Physical Sciences)

020. Occupations in mathematics
(Mathematics)
021. Occupations in astronomy
(Astronomy)
022. Occupations in chemistry
(Chemistry)
023. Occupations in physics
(Physics)
024. Occupations in geology
(Geology)
025. Occupations in meteorology
(Meteorology)
029. Occupations in mathematics and physical sciences, n.e.c.
(Mathematics and physical sciences, n.e.c.)

04 Occupations in Life Sciences
(Life Sciences)
040. Occupations in agricultural sciences
(Agricultural sciences)
041. Occupations in bilogical sciences
(Biological sciences)
045. Occupations in psychology
(Psychology)
049. Occupations in life sciences, n.e.c.
(Life sciences, n.e.c.)

05 Occupations in Social Sciences
(Social Sciences)

050. Occupations in economics
(Economics)
051. Occupations in political science
(Political science)
052. Occupations in history
(History)
054. Occupations in sociology
(Sociology)
055. Occupations in anthropology
(Anthropology)
059. Occupations in social sciences, n.e.c.
(Social sciences, n.e.c.)

07 Occupations in Medicine and Health
(Medicine and Health)

070. Physicians and surgeons
(Medicine and surgery)

071. Osteopaths
(Osteopathy)
072. Dentists
(Dentistry)
073. Veterinarians
(Veterinary medicine and surgery)
074. Pharmacists
(Pharmacy)
075. Registered nurses
(Nursing)
077. Dietitians
(Dietetic work)
078. Occupations in medical and dental technology
(Medical and dental technology)
079. Occupations in medicine and health, n.e.c.
(Medicine and health, n.e.c.)

09 Occupations in Education
(Education)

090. Occupations in college and university education
(College and unversity education)
091. Occupations in secondary school education
(Secondary school education)
092. Occupations in primary school and kindergarten education
(Primary school and kindergarten education)
094. Occupations in education of the handicapped
(Education of the handicapped)
096. Home economists and farm advisers
(Home economics, agriculture, and related education)
097. Occupations in vocational education, n.e.c.
(Vocational education, n.e.c.)
099. Occupations in education, n.e.c.
(Education, n.e.c.)

10 Occupations in Museum, Library, and Archival Sciences
(Museum, Library, and Archival Sciences)

100. Librarians
(Library work)
101. Archivists
(Archival science work)
102. Museum curators and related occupations
(Museum, library, and archival sciences, n.e.c.)
109. Occupations in museum, library, and archival sciences, n.e.c.
(Museum, library, and archival sciences, n.e.c.)

11 Occupations in Law and Jurisprudence
(Law and Jurisprudence)

110. Lawyers
(Legal work)

111. Judges
(Judicial work)
119. Occupations in law and jurisprudence,n.e.c.
(Law and jurisprudence, n.e.c.)

12 Occupations in Religion and Theology
(Religion and Theology)

120. Clergymen
(Ministerial work)
129. Occupations in religion and theology, n.e.c.
(Religion and theology, n.e.c.)

13 Occupations in Writing
(Writing)

130. Freelance writers
(Freelance writing)
131. Writers and editors, motion pictures, radio, and television
(Writing and editing, motion pictures, radio, and television)
132. Writers and editors, publications
(Writing and editing, publications)
137. Interpreters and translators
(Interpreting and translating)
139. Occupations in writing, n.e.c.
(Writing, n.e.c.)

14 Occupations in Art
(Art Work)

141. Commercial artists
(Commercial art)
142. Designers
(Designing)
143. Occupations in photography
(Photography)
144. Painters and related occuaptions
(Painting and related work)
148. Sculptors and related occupations
(Sculpturing and related work)
149. Occupations in art, n.e.c.
(Art work, n.e.c.)

15 Occupations in Entertainment and Recreation
(Entertainment and Recreation)

150. Occupations in dramatics
(Dramatics)
151. Occupations in dancing
(Dancing)

152. Occupation in music
(Music)
153. Occupations in athletics and sports
(Athletic and sports)
159. Occupations in entertainment and recreation, n.e.c.
(Entertainment and recreation, n.e.c.)

16 Occupations in Administrative Specializations
(Administrative Specialties)

160. Accountants and auditors
(Accounting and auditing)
161. Budget and management analysis occupations
(Budget and management analysis
162. Purchasing management occupations
(Purchasing management)
163. Sales and distribution management occupations
(Sales and distribution management)
164. Advertising management occupations
(Advertising management)
165. Public relations management occupations
(Public relations management)
166. Personnel and training administration occupations
(Personnel and training administration)
168. Inspectors and investigators, managerial and public service
(Inspecting and investigating, managerial and public service)
169. Occupations in administrative specializations, n.e.c.
(Administrative specialties, n.e.c.)

18 Managers and Officials, N.E.C.
(Managerial Work, N.E.C.)

180. Agriculture, forestry, and fishing industry managers and officials
(Agriculture, forestry, and fishing management)
181. Mining industry managers and officials
(Mining management)
182. Construction industry managers and officials
(Construction management)
183. Manufacturing industry managers and officials
(Manufacturing industry management)
184. Transportation, communication, and utilities industry managers and officials
(Transportation, communication, and utilities management)
185. Wholesale and retail trade managers and officials
(Wholesale and retail trade management)
186. Finance, insurance, and real estate management)
(Finance, insurance, and real estate management)

187. Service industry managers and officials
(Service industry management)
188. Public administration managers and officials
(Public administration management)
189. Miscellaneous managers and officials, n.e.c.
(Miscellaneous managerial work, n.e.c.)

19 Miscellaneous Professional, Technical, and Managerial Occupations
(Miscellaneous Professional, Technical and Managerial Work)

191. Agents and appraisers, n.e.c.
(Business relations work, n.e.c.)
193. Radio operators
(Radio operating)
194. Sound recording, transcribing, and reproduction occupations
(Sound recording, transcribing, and reproducing)
195. Occupations in social and welfare work
(Social and welfare work)
196. Airplne pilots and navigators
(Airplane piloting and navigating)
197. Ship captains, mates, pilots, and engineers
(Managerial and technical work, water trasnportation)
198. Railroad conductors
(Managerial work, railroad transportation)
199. Miscellaneous professional, technical, and managerial work, n.e.c.)

APPENDIX III-B

EXPLANATION OF THE SECOND THREE-DIGIT CODING OF D.O.T. CLASSIFICATION NUMBERS AND AN EXPLANATION OF THE CONSTITUENT COMPONENTS OF WORKER TRAITS LISTINGS

The following sections of this appendix represent a condensation of the full explanation of the above titled items as they are explained under Appendices A and B of the Dictionary of Occupational Titles, third edition, Volume II, "Occupational Classification," pp. 649 to 656. For a complete explanation of these classification schemes the reader should consult this source.

LAST THREE D.O.T. DIGITS

Explanation of Relationships Within Data, People, Things Hierarchies

Much of the information in this edition of the Dictionary is based on the premise that every job requires a worker to function in relation to Data, People, and Things, in varying degrees. These relationships are identified and explained below. They appear in the form of three hierarchies arranged in each instance from the relatively simple to the complex in such a manner that each successive relationship includes those that are simpler and excludes the more complex. The identifications attached to these relationships are referred to as worker functions, and provide standard terminology for use in summarizing exactly what a worker does on the job by means of one or more meaningful verbs.

A job's relationship to Data, People, and Things can be expressed in terms of the highest appropriate function in each hierarchy to which the

worker has an occupationally significant relationship, and these functions taken together indicate the total level of complexity at which he must perform. The last three digits of occupational code numbers in the Dictionary reflect significant relationships to Data, People, and Things, respectively. These last three digits express a job's relationship to Data, People, and Things by identifying the highest appropriate function in each hierarcy to which the job requires the worker to have a significant relationship, as reflected by the following table:

DATA (4th digit)	PEOPLE (5th digit)	THINGS (6th digit)
0 Synthesizing	0 Mentoring	0 Setting-up
1 Coordinating	1 Negotiating	1 Precision Working
2 Analyzing	2 Instructing	2 Operating-Controlling
3 Compiling	3 Supervising	3 Driving-Operating
4 Computing	4 Diverting	4 Manipulating
5 Copying	5 Persuading	5 Tending
6 Comparing	6 Speaking-Signaling	6 Feeding-Offbearing
7)	7 Serving	7 Handling
8) No significant relationship	8 No significant relationship	8 No significant relationship

Explanation of Worker Trait Components

These six components have been selected for this purpose because they provide the broadest and yet most comprehensive framework for the effective presentation of worker trait information. Within this framework the user will find data concerning the requirements of jobs for: (1) The amount of general educational development and specific vocational preparation a worker must have, (2) the specific capacities and abilities required of him in order to learn or perform certain tasks or duties, (3) preferences for certain types of work activities or experiences considered necessary for job success, (4) types of occupational situations to which an individual must adjust, (5) physical activites required in work situations, and (6) physical

surroundings prevalent in jobs.

The worker trait components are:

I. Training time (general educational development, specific vocational preparation)
II. Aptitudes
III. Interests
IV. Temperaments
V. Physical demands
VI. Working conditions

Within each of the six categories listed on the previous page, there are elaborate systems for establishing a numerical rank to correspond to each category. These ranking systems have been left out of this Appendix in the interest of brevity. The general category description are as follows:

I. Training Time

The amount of general educational development and specific vocational preparation required for a worker to acquire the knowledge and abilities necessary for average performance in a particular job.

General Education Development: This embraces those aspects of education (formal and informal) which contribute to the worker's (a) reasoning development and ability to follow instructions, and (b) acquisition of "tool" knowledges, such as language and mathematical skills. It is education of a general nature which does not have a recognized, fairly specific, occupational objective. Ordinarily such education is obtained in elementary school, high school, or college. It also derives from experience and indivd-ual study.

Specific vocational Preparation: The amount of time required

to learn the techniques, acquire information, and develop the facility needed for average performance in a specific job-worker situation. This training may be acquired in a school, work, military, institutional, or avocational environment. It does not include orientation training required or even every fully qualified worker to become accustomed to the special conditions of any new job. Specific vocational training includes training given in any of the following circumstances:

a. Vocational education (such as high school commercial or shop training, technical school, art school, and that part of college training which is organized around a specific vocational objective);

b. Apprentice training (for apprenticeable jobs only);

c. In-plant training (given by an employer in the form of organized classroom study);

d. On-the-job training (serving as learner or trainee on the job under the instruction of a qualified worker);

e. Essential experience in other jobs (serving in less responsible jobs which lead to the higher grade job or serving in other jobs which qualify).

II. Aptitudes

Specific capacities and abilities required of an individual in order to learn or perform adequately a task or job duty.

G Intelligence

V Verbal

N Numerical

S Spatial

P Form Perception

Q Clerical Perception

K Motor Coordination

F Finger Dexterity

M Manual Dexterity

E Eye-Hand-Foot Coordination

C Color Discrimination

III. Interests

Preferences for certain types of work activities or experiences, with accompanying rejection of contrary types of activities or experiences. Five pairs of interest factors are provided so that a positive preference for one factor of a pair also implies rejection of the other factor of that pair.

IV. Temperaments

Different types of occupational situations to which workers must adjust.

V. Physical Demands

Physical Demands are those physical activites required of a worker in a job.

The physical demands referred to in this Dictionary serve as a means of expressing both the physical requirements of the job and the physical capacities (specific physical traits) a worker must have to meet the requirements. For example, "seeing" is the name of a physical demand required by many jobs (perceiving

by the sense of vision), and also the name of a specific capacity possessed by many people (having the power of sight). The worker must possess physical capacities at least in an amount equal to the physical demands made by the job.

VI. Working Conditions

Working conditions are the physical surroundings of a worker in a specific job.

APPENDIX III-C

HEGIS Academic Programs Classification

The following is a list of academic program areas as set forth in "A Taxonomy of Instructional Programs in Higher Education," U. S. Department of Health, Education, and Welfare, OE-50064. For a specific line-by-line listing of the various categories within each area, this taxonomy should be consulted.

CONVENTIONAL ACADEMIC SUBDIVISIONS OF KNOWLEDGE AND TRAINING

0100 AGRICULTURE and NATURAL RESOURCES

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with the production of food and management of natural fiber, plant, forest, and wild-life resources.

0200 ARCHITECTURE and ENVIRONMENTAL DESIGN

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with training for a profession in designing buildings, communities, parks, and other man-made aspects of the physio-social environment.

0300 AREA STUDIES

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with programs designed to study cultures indigenous to specific geographic regions.

0400 BIOLOGICAL SCIENCES

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with the science of life or living matter in all its forms and pehnomena especially with regard to the origin, growth, reproduction, and structure of life forms.

0500 BUSINESS and MANAGEMENT

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. related to the organization, operation, administration, and control of private and public organizations.

0600 COMMUNICATIONS

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. related to collection, preparation, and presentation of ideas and information intended for popular consumption through mass media.

0700 COMPUTER and INFORMATION SCIENCE

Subject field designations which characterize students, faculty, facilities, degree programs, course work, research projects, etc. having to do with the design, development, and application of computer capabilities to data storage and manipulation and related computational procedures.

0800 EDUCATION

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. related to administration and control of education organizations and institutions and subjects related to instruction and services both within and outside of such formal organizations.

0900 ENGINEERING

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with the practical application of basic scientific knowledge to the design, production, and operation of systems intended to facilitate man's control and use of his natural environment.

1000 FINE and APPLIED ARTS

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with the creation and appreciation of the diverse modes of communicating ideas and emotions by means of stylized, visual, and non-visual representations and symbols.

1100 FOREIGN LANGUAGES

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. related to mastery of a language other than English or related to the study of a foreign culture through exploration of the literature of that culture as expressed in the vernacular language.

1200 HEALTH PROFESSIONS

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with the maintenance and restoration of physical and mental health.

1300 HOME ECONOMICS

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with the theory and practice of family and home care including the science of foods, home decoration and management and child care.

1400 LAW

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with instruction in the legal customs, practices, and rules of society and states for the purpose of pursuing a career in jurisprudence.

1500 LETTERS

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with English language and literature and value systems related to ancient and modern cultures.

1600 LIBRARY SCIENCE

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with instruction in the professional skills required to organize collections of books and related materials and the training necessary for providing services related to them.

1700 MATHEMATICS

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with the science of numbers and space configurations and their operations, measurement, relationships, and abstractions.

1800 MILITARY SCIENCES

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with techniques and skills unique to the pursuit of a professional career as a military officer.

1900 PHYSICAL SCIENCES

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with the basic nature of matter, energy, and associated phenomena.

2000 PSYCHOLOGY

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with behavioral and mental processes.

2100 PUBLIC AFFAIRS and SERVICES

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. related to developing and improving competencies in the management and operation of governmental agencies.

2200 SOCIAL SCIENCES

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. having to do with all aspects of the past and present activities, conduct, interactions, and organizations of humans.

2300 THEOLOGY

Subject field designations which characterize students, faculty, facilities, degree programs, research projects, etc. related to preparation and training for a religious vocation.

4900 INTERDISCIPLINARY STUDIES

Subject field designations which charactertize students, faculty, facilities, degree programs, research projects, etc. involving more than one major discipline without primary concentration in any one area.

TECHNOLOGICAL AND OCCUPATIONAL CURRICULUMS LEADING TO ASSOCIATE DEGREES AND OTHER AWARDS BELOW THE BACCALAUREATE

5000 BUSINESS and COMMERCE TECHNOLOGIES

Subject field designations which characterize students, faculty, facilities, degree and certificate programs, etc. specifically associated with development of skills required for commercial, business, or secretarial occupations at the semiprofessional level. Two years of preparation beyond high school are usually sufficient for entrance into these occupational fields.

5100 DATA PROCESSING TECHNOLOGIES

Subject field designations which characterize students, faculty, facilities, degree and certificate programs, etc. specifically associated with development of skills required for data processing or related occupations at the semiprofessional level. Two years of preparation beyond high school are usually sufficient for entrance into these occupational fields.

5200 HEALTH SERVICES and PARA-MEDICAL TECHNOLOGIES

Subject field designations which characterize students, faculty, facilities, degree and certificate programs, etc. specifically associated with development of skills required for health service related occupations at the semiprofessional level. Two years of preparation beyond high school are usually sufficient for entrance into these occupational fields.

5300 MECHANICAL and ENGINEERING TECHNOLOGIES

Subject field designations which characterize students, faculty, facilities, degree and certificate programs, etc. specifically associated with development of skills required for mechanical and engineering related occupations at the semiprofessional level. Two years of preparation beyond high school are usually sufficient for entrance into these occupational fields.

5400 NATURAL SCIENCE TECHNOLOGIES

Subject field designations which charactertize students, faculty, facilities, degree and certificate programs, etc. specifically associated with development of skills required for natural science related occupations at the semiprofessional level. Two years of preparation beyond high school are usually sufficient for entrance into these occupational fields.

5500 PUBLIC SERVICE RELATED TECHNOLOGIES

Subject field designations which characterize students, faculty, facilities, degree and certificate programs, etc. specifically associated with development of skills required for public service related occupations at the semiprofessional level. Two years of preparation beyond high school are usually sufficient for entrance into these occupational fields.

CHAPTER IV

PROJECTIONS OF DEGREES AWARDED IN 1975 AND 1980

Methodological Statement

The format utilized in projecting degrees awarded is that used by the Higher Education General Information Survey (HEGIS). Disciplines were classified according to A Taxonomy of Instructional Programs in Higher Education (U. S. Department of Health, Education, and Welfare, OE-50064, 1970). One major advantage of this revised HEGIS classification system is its separation of Associate-degree level disciplines from disciplines at the Baccalaureate and graduate levels. Such a separation recognizes the frequently more narrow occupational nature of many two-year programs. In addition, it should be noted that sixth-year degrees in educational disciplines are classified by HEGIS under the Master's category.

HEGIS questionnaires 2301-2.1, "Degrees and Other Formal Awards Conferred" prior to 1971 did not follow the Taxonomy, however. Thus, it was necessary to compile a translation table in order that previous summaries of degrees conferred might be utilized. A translation table by broad discipline categories was prepared for the Baccalaureate, graduate, and professional levels of study (Table 1). Since Associate degrees awarded had never been aggregated by discipline on either the state or national levels, it was necessary to categorize the Associate degrees awarded from the raw data. To this end, the index of the Taxonomy was utilized, along with various translation schemes prepared by

Dr. Francis J. Degnan for the State Technical Colleges and Regional Community Colleges. A categorization of degrees on all levels actually awarded in Connecticut in 1970 may be found in Table 2.

No projections of degrees awarded have been prepared for Connecticut by the Commission. However, full-time undergraduate enrollments for all institutions of higher education in Connecticut have been projected through 1980. [1] Because these enrollment projections were developed methodically, it was decided to utilize them as a basis for deriving degrees-awarded projections for both graduates and undergraduates.

When a similar lack of information was encountered in a higher education survey in Long Island [2] an extrapolation formula projecting degrees awarded was used. In general:

$$\frac{G_{y'}}{G_y} = t \log (1 + g)$$

Where $G_{y'}$ represents the number of degrees awarded in a given projected year, G_y represents the number of degrees awarded in the base year, t represents y' -y, and g the estimated annual growth rate of enrollment.

Utilizing the statewide Associate-level and Bachelor-level enrollment projections, separate growth rates were calculated by considering 1970 the base year (y) and 1975 and 1980 each projected years (y'). A compound interest table was utilized to interpolate the growth of enrollment between the base and projected years in order that annual growth rates (g) might be estimated. Graphically, g represents the slope of a straight line drawn between the logarithms of enrollment in the base year and the enrollment in the projected year.

Defining the base year 1970 as 1.000, Associate degree projections for 1975 and 1980 are 2.090 and 3.340, respectively, and Bachelor degree projections are 1.265 and 1.490, respectively.

Once undergraduate degrees had been projected, a method for projecting graduate degrees awarded had to be developed. Two alternatives for projecting graduate degrees awarded were (a) extrapolating past graduate degrees awarded or (b) applying some historical relationship between undergraduate and graduate data to the projections. By extrapolating past degrees awarded, one would assume that the growth rate of higher education during the 1960's will continue in the 1970's. National projections at the graduate level indicate a diminishing growth rate, however. [3] In addition, the anticipated slackening of undergraduate enrollment would tend to curb the number of teaching assistantships and other financial props to graduate enrollments. Thus, it was decided to explore the extent to which graduate degrees awarded were related to undergraduate enrollment and degrees awarded.

From 1966 through 1970, the proportion of graduate degrees to the total number of graduate and undergraduate degrees awarded was found to range between 28.5% and 32.5% annually, with no discernable trend over this time period. One should consider, however, that the Associate degree does not satisfy entrance requirements for graduate programs; hence relating the two levels is of doubtful value. Additionally, the strong projected growth rate of Associate-level enrollment seems to reflect the nascent status of Connecticut's Regional Community College system in 1970. Consequently, it was decided to limit the undergraduate data base to

Baccalaureate information, and to extend the relationship between the number of Baccalaureate and the number of graduate degrees awarded between 1966 and 1970 to derive a projection of graduate degrees awarded. These relationships, averaged for the five years, indicate that compared to the number of Bachelor's degrees awarded, graduate degrees totaled 53.2%. By graduate degree level, the ratios indicate that compared to the number of Baccalaureates, Master's amounted to 42.6%, Doctorates to 5.3%, and First Professional degrees to 5.3%.

Results of the alternative methods for projecting graduate degrees awarded may be compared in Table A, where "Alternative A" is the extrapolation of past graduate degrees awarded and "Alternative B" is the derivation from the historical relationships between Bachelor's and graduate degrees. Again, the more conservative Alternative B was chosen for use throughout this report.

1975	Master's	Doctor's	1st Prof.
Alternative "A"	7,495	805	1,316
Alternative "B"	6,033	751	751
1980			
Alternative "A"	11,240	1,205	4,062
Alternative "B"	7,490	932	932

TABLE A

In order to utilize the degree-awarded projections in a supply/demand interface, it was necessary to reallocate the degrees among academic disciplines. Conversation with Dr. Levenson revealed that while he was able to project the degree-level growth rate by utilizing individual institution's enrollment projections, he found it impossible to allocate

growth rate among the various disciplines. Rather, Levenson imposed the overall growth rates on the various disciplines. This technique assumes that a historical mix among the various disciplines will be maintained in the future. Obviously, the mix will shift in the future; the anticipated growth of the health professions within higher education is an outstanding example of such a shift. Yet assuming the present mix is of particular value to educational planners, for it reveals to them what the supply of highly educated manpower will be in a future year if no new institutions, new programs, or discontinuances take place.

Utilizing the present-mix technique in the Connecticut study, it was decided that degrees-awarded projections for the various disciplines be based upon recent HEGIS data. However, compilation of the HEGIS questionnaires complete to a sufficient degree to be comparable by discipline at the Bachelor's and graduate levels are not available for Connecticut before 1969. No compilation by discipline had ever been prepared in the State for Associate degrees. As a result, the discipline mix among 21 HEGIS four-year and above categories was averaged for degrees awarded in 1969 and 1970. The mix among the seven Associate-level disciplines is that of 1970, the only year for which data could be compiled.

The degrees-awarded projections for 1975 and 1980 (Tables 3 and 4) were completed by multiplying the total number of degrees projected at each degree level by that level's distribution of disciplines, by percentage. A comparison of degrees-awarded projections for Connecticut and the United States may be found in Tables 5, 6, and 7. In these tables, Connecticut data was shifted into the format used by the Office of Education for the national projections. At this point it should be noted that

because of rounding, the projected totals of degrees awarded were sometimes adjusted slightly in order that the sums of rows and columns might agree.

# # #

NOTES FOR CHAPTER IV

[1] Francis J. Degnan, An Estimate of the Total Full-Time Undergraduate College Population of Connecticut Residents and a Projection of Enrollments for Higher Education in Connecticut Based Upon This Estimate (Commission for Higher Education, April 1970).

[2] Albert M. Levenson, Manpower Supply and Demand in Nassau-Suffolk 1965-1975 (Hempstead, N. Y.: Hofstra University Center for Business and Urban Research, February 1970) p. 49 n.

[3] Projections of Education Statistics to 1979-80, 1970 Edition (U. S. Dept. of Health, Education, and Welfare, OE-10030-70) p. 5, fig. 4.

TABLE IV-1

HEGIS TAXONOMY TRANSLATION TABLES

FIRST-PROFESSIONAL DEGREES AND BACHELOR'S, MASTER'S, AND DOCTOR'S DEGREES

NOTE: These tables will translate the categories used in Connecticut's HEGIS degrees-conferred summaries through 1970. Two-year degrees conferred data were translated according to various schemes developed by the CHE.

- - - - - -

NEW	OLD
0100 Agriculture & Natural Resources	(1000 Agriculture (3800 Forestry
0200 Architecture & Environmental Design	(1400 Architecture (1500 City Planning
0400 Biological Sciences	1700 Biological Sciences
0500 Business & Management	2000 Business & Commerce
0700 Computer & Information Sciences	2100 Computer Sciences
0800 Education	2300 Education
0900 Engineering	2600 Engineering
1000 Fine & Applied Arts	3200 Fine & Applied Arts
1100 Foreign Languages	3500 Foreign Languages (even though linguistics has been separated)
1200 Health Professions	(4400 Health Professions (4416 Medicine, M.D. (now 1206)
1300 Home Economics	4700 Home Economics
1400 Law	4000 Law (now 1401)

(Table IV-1, cont'd)

1500	Letters	(2900	English & Journalism (even (though Journalism has been (placed in 0600) (
		(6500	Philosophy
1600	Library Science	5300	Library Science
1700	Mathematics	5600	Mathematical Sciences
1800	Military Sciences	5900	Military Science
1900	Physical Sciences	6800	Physical Sciences
2000	Psychology	7100	Psychology (despite one slight exception)
2200	Social Sciences	(7700	Social Sciences (despite alloca- (tion of segment to 0300, ("Area Studies")
		(4100	Geography
2300	Theology	(7500	Religion (
		(7404	Theological Professions (now 2301)
4900	Interdisciplinary Studies	(8300	Broad General Curriculums & (Miscellaneous Fields
		(9799	Other 1st Professional

# # #

NOTE: Classification for 5000 Series, "Technological and Occupational Curriculums Leading to Associate Degrees and Other Awards Below the Baccalaureate," may be found in Section II of the Taxonomy.

TABLE IV-2

ACTUAL DEGREES AWARDED BY ALL INSTITUTIONS IN CONNECTICUT
IN 1970 / BY HEGIS CATEGORIES

TOTAL OF DEGREES AWARDED, ALL LEVELS: 18,669						
New HEGIS Code		Bachelor	Master (incl. 6th)	Doctor	First Profess.	TOTAL
0100	Agriculture & Natural Resources	58	34	8	----	100
0200	Architecture & Environmental Design	8	72	----	----	80
0400	Biological Sciences	460	138	66	----	664
0500	Business & Management	1,224	266	----	----	1,490
0700	Computer & Information Sciences	----	1	1	----	2
0800	Education	2,365	2,217	35	----	4,617
0900	Engineering	489	333	50	----	872
1000	Fine & Applied Arts	282	173	10	----	465
1100	Foreign Languages	341	121	48	----	510
1200	Health Professions	358	78	2	83	521
1300	Home Economics	190	75	----	----	265
1400	Law	----	17	10	218	245
1500	Letters	1,452	180	43	----	1,675
1600	Library Science	22	42	----	----	64

TABLE IV-2, CONT'D

1970

New HEGIS Code		-B-	-M-	-D-	-1st P.-	TOTAL
700	Mathematics	314	64	21	----	399
800	Military Sciences	135	5	----	----	140
900	Physical Sciences	239	78	74	----	391
000	Psychology	572	21	22	----	615
200	Social Sciences	2,372	480	104	----	2,956
300	Theology	69	83	17	122	291
900	Interdisciplinary Studies	125	53	----	25	203
OTAL, "B" and above		11,075	4,531	511	448	16,565

ASSOCIATE DEGREES ONLY	
5000 Business & Commerce Technologies	427
5100 Data Processing Technologies	110
5200 Health Services & Paramedical Technologies	37
5300 Mechanical & Engineering Technologies	428
5400 Natural Science Technologies	----
5500 Public Service Related Technologies	44
5600 Arts & Science or General Programs	1,058
TOTAL, Associate	2,104

TABLE IV-3

ANNUAL DEGREES AWARDED BY ALL INSTITUTIONS IN CONNECTICUT
PROJECTED FOR 1975 / BY HEGIS CATEGORIES

PROJECTED TOTAL OF DEGREES AWARDED, ALL LEVELS: 27,265						
New HEGIS Code		Bachelor	Master (incl. 6th)	Doctor	First Profess.	TOTAL
0100	Agriculture & Natural Resources	71	45	9	----	125
0200	Architecture & Environmental Design	10	94	----	----	104
0400	Biological Sciences	551	198	88	----	837
0500	Business & Management	1,488	314	----	----	1,802
0700	Computer & Information Sciences	----	1	1	----	2
0800	Education	3,073	2,908	51	----	6,032
0900	Engineering	722	317	66	----	1,105
1000	Fine & Applied Arts	395	251	20	----	666
1100	Foreign Languages	476	187	60	----	723
1200	Health Professions	455	102	4	127	688
1300	Home Economics	226	62	----	----	288
1400	Law	----	22	14	398	434
1500	Letters	1,801	323	63	----	2,187
1600	Library Science	27	55	----	----	82

TABLE IV-3, CONT'D

1975

New HEGIS Code		-B-	-M-	-D-	-1st P.-	TOTAL
00	Mathematics	425	112	31	----	568
00	Military Sciences	170	7	----	----	177
00	Physical Sciences	309	138	126	----	573
00	Psychology	698	37	37	----	772
00	Social Sciences	3,070	634	142	----	3,846
00	Theology	78	144	30	185	437
00	Interdisciplinary Studies	115	83	5	41	244
TAL, "B" and above		14,160	6,034	747	751	21,692

ASSOCIATE DEGREES ONLY		
5000	Business & Commerce Technologies	1,131
5100	Data Processing Technologies	291
5200	Health Services & Paramedical Technologies	98
5300	Mechanical & Engineering Technologies	1,134
5400	Natural Science Technologies	----
5500	Public Service Related Technologies	116
5600	Arts & Science or General Programs	2,803
	TOTAL, Associate	5,573

TABLE IV-4

ANNUAL DEGREES AWARDED BY ALL INSTITUTIONS IN CONNECTICUT
PROJECTED FOR 1980 / BY HEGIS CATEGORIES

PROJECTED TOTAL OF DEGREES AWARDED, ALL LEVELS: 35,833						
New HEGIS Code		Bachelor	Master (incl. 6th)	Doctor	First Profess.	TOTA
0100	Agriculture & Natural Resources	88	55	11	----	15
0200	Architecture & Environmental Design	12	117	----	----	12
0400	Biological Sciences	684	246	109	----	1,03
0500	Business & Management	1,848	389	----	----	2,23
0700	Computer & Information Sciences	----	1	2	----	
0800	Education	3,815	3,610	63	----	7,48
0900	Engineering	897	393	81	----	1,37
1000	Fine & Applied Arts	490	312	25	----	82
1100	Foreign Languages	591	232	74	----	89
1200	Health Professions	564	127	4	157	85
1300	Home Economics	281	76	----	----	35
1400	Law	----	28	18	494	54
1500	Letters	2,236	401	84	----	2,72
1600	Library Science	33	68	----	----	10

TABLE IV-4, CONT'D

1980

New HEGIS Code		-B-	-M-	-D-	-1st P.-	TOTAL
'00	Mathematics	527	138	38	----	703
300	Military Sciences	211	8	----	----	219
900	Physical Sciences	383	172	157	----	712
000	Psychology	867	46	46	----	959
200	Social Sciences	3,812	787	176	----	4,775
300	Theology	97	178	37	230	542
900	Interdisciplinary Studies	142	103	6	51	302
OTAL, "B" and above		17,578	7,487	931	932	26,928

ASSOCIATE DEGREES ONLY		
5000	Business & Commerce Technologies	1,807
5100	Data Processing Technologies	465
5200	Health Services & Paramedical Technologies	156
5300	Mechanical & Engineering Technologies	1,812
5400	Natural Science Technologies	----
5500	Public Service Related Technologies	186
5600	Arts & Science or General Programs	4,479
	TOTAL, Associate	8,905

BACCALAUREATE AND ABOVE DEGREES AWARDED IN 1970

CONNECTICUT AND UNITED STATES

	Bachelor's & 1st Professional				Master's (incl. 6th Year)				Doctor's			
	United States[a]		Connecticut[d]		United States[b]		Connecticut[d]		United States[c]		Connecticut[d]	
	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%
Agriculture & Forestry	11,070	1.4	58	0.5	2,680	1.2	34	0.7	800	2.7	8	1.6
Biological Sciences	37,180	4.7	460	4.0	6,580	3.0	138	3.0	3,410	11.6	66	12.9
Business & Commerce	102,650	13.0	1,224	10.6	24,440	11.1	266	5.9	670	2.3	--	--
Education	120,460	32.4	2,365	20.5	71,130	32.4	2,217	48.9	5,030	17.2	35	6.8
Engineering	41,090	15.4	489	4.2	16,900	7.7	333	7.3	3,980	13.6	50	9.8
Fine Arts	52,250	6.7	290	2.5	13,850	6.3	245	5.4	990	3.4	10	2.0
Foreign Languages	23,790	3.0	341	3.0	6,390	2.9	121	2.7	860	2.9	48	9.4
Health Professions	33,600	4.3	441	3.8	4,670	2.1	78	1.7	310	1.0	2	0.4
English & Journalism	62,840	8.0	1,452	12.6	10,890	5.0	180	4.0	1,310	4.5	43	8.4
Library Science	1,000	0.1	22	0.2	7,190	3.3	42	0.9	20	0.1	--	--
Mathematics & Statistics	29,740	3.8	314	2.7	7,950	3.6	65	1.4	1,350	4.6	22	4.3
Physical Sciences	21,090	2.7	239	2.1	6,300	2.9	78	1.7	4,220	14.4	74	14.5
Psychology	31,360	4.0	572	5.0	4,700	2.1	21	0.5	1,720	5.9	22	4.3
Social Sciences[f]	152,690	19.5	2,372	20.6	26,930	12.3	480	10.6	3,650	12.5	104	20.4
Other & Interdisciplinary	63,190	8.0	884	7.7	8,700	4.0	233	5.1	980	3.3	27	5.3
TOTAL	784,000	100.0[g]	11,523	100.0	219,200	100.0	4,531	100.0	29,300	100.0	511	100.0

TABLE IV-5

See Footnotes at bottom of table IV-7

BACCALAUREATE AND ABOVE DEGREES PROJECTED FOR 1975

CONNECTICUT AND UNITED STATES

	Bachelor's & 1st Professional				Master's (incl. 6th Year)				Doctor's			
	United States[a]		Connecticut[d,e]		United States[b]		Connecticut[d,e]		United States[c]		Connecticut[d,e]	
	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%
Agriculture & Forestry	10,470	1.1	71	0.5	2,480	0.8	45	0.7	910	2.0	9	1.2
Biological Sciences	49,650	5.2	551	3.7	10,530	3.2	198	3.3	5,440	11.7	88	11.8
Business & Commerce	113,250	11.8	1,448	10.0	43,380	13.3	314	5.2	1,220	2.6	--	--
Education	123,950	12.9	3,073	20.6	87,050	26.7	2,908	48.2	7,870	16.9	51	6.8
Engineering	45,930	4.8	722	4.8	24,400	7.5	317	5.2	7,880	16.9	66	8.8
Fine Arts	65,430	6.8	405	2.7	20,330	6.2	345	5.7	1,260	2.7	20	2.7
Foreign Languages	39,130	4.1	476	3.2	12,790	3.9	187	3.1	1,500	3.2	60	8.0
Health Professions	38,840	4.0	582	3.9	6,350	1.9	102	1.7	440	0.3	4	0.5
English & Journalism	88,820	9.3	1,801	12.1	18,520	5.7	323	5.4	2,120	4.5	63	8.4
Library Science	1,280	0.1	27	0.2	12,240	3.8	55	0.9	30	0.1	--	--
Mathematics & Statistics	40,840	4.2	425	2.8	14,690	4.5	113	1.9	2,550	5.5	32	4.2
Physical Sciences	19,810	2.1	309	2.0	7,040	2.2	138	2.3	5,920	12.7	126	16.9
Psychology	45,320	4.7	698	4.7	8,280	2.5	37	0.6	2,660	5.7	37	5.0
Social Sciences[f]	211,850	22.1	3,070	20.6	45,910	14.1	634	10.5	5,590	12.0	142	19.0
Other & Interdisciplinary	64,430	6.7	1,213	8.1	11,010	3.4	318	5.3	1,210	2.6	49	6.6
TOTAL	959,000	100.0[g]	14,911	100.0	325,200	100.0	6,034	100.0	46,610	100.0	747	100.0

TABLE IV-6

See Footnotes at bottom of table IV-7

BACCALAUREATE AND ABOVE DEGREES PROJECTED FOR 1980

CONNECTICUT AND UNITED STATES

	Bachelor's & 1st Professional				Master's (incl. 6th Year)				Doctor's			
	United States[a]		Connecticut[d,e]		United States[b]		Connecticut[d,e]		United States[c]		Connecticut[d,e]	
	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%	Actual	%
Agriculture & Forestry	9,390	0.8	88	0.5	3,030	0.7	55	0.7	730	1.2	11	1.2
Biological Sciences	62,990	5.6	684	3.7	15,060	3.5	246	3.3	7,310	11.7	109	5.2
Business & Commerce	121,700	10.7	1,848	10.0	64,730	15.0	389	5.2	1,810	2.9	--	--
Education	114,170	10.1	3,815	20.6	90,160	20.8	3,610	48.2	10,350	16.6	63	6.8
Engineering	50,410	4.4	897	4.8	30,750	7.1	393	5.2	12,650	20.2	81	8.8
Fine Arts	77,860	6.9	502	2.7	27,120	6.3	429	5.7	1,330	2.1	25	2.7
Foreign Languages	57,150	5.0	591	3.2	22,180	5.1	232	3.1	2,210	3.5	74	8.0
Health Professions	41,970	3.7	721	3.9	7,940	1.8	127	1.7	510	0.8	4	0.5
English & Journalism	116,840	10.3	2,236	12.1	28,420	6.6	401	5.4	2,880	4.6	84	8.4
Library Science	1,580	0.1	33	0.2	19,020	4.4	68	0.9	40	0.1	--	--
Mathematics & Statistics	52,980	4.7	527	2.8	23,290	5.4	139	1.9	3,970	6.4	40	4.2
Physical Sciences	18,070	1.6	383	2.0	6,210	1.4	172	2.3	6,870	11.0	157	16.9
Psychology	60,740	5.4	867	4.7	12,910	3.0	46	0.6	3,470	5.5	46	5.0
Social Sciences[f]	277,290	24.5	3,812	20.6	68,800	15.9	787	10.5	7,210	11.5	176	19.0
Other & Interdisciplinary	69,860	6.2	1,506	8.1	12,620	2.9	393	5.3	1,160	1.8	61	6.6
TOTAL	1,133,000	100.0[g]	18,510	100.0	432,500	100.0	7,487	100.0	62,500	100.0	931	100.0

a. Source: Projections of Educational Statistics to 1979-80 (OE 10030-70), Table 23
b. Ibid, Table 24
c. Ibid, Table 25
d. Projected as explained in text, cf. Tables IV-2, 3, 4
e. 1975 and 1980 percentages in this column are identical, as explained in text.
f. Includes OE's "Social Work" category
g. Details may not add exactly to 100.0, because of rounding.

TABLE IV-7

CHAPTER V

CONSIDERATIONS FROM THE PERSPECTIVE OF DEMAND

This chapter is primarily concerned with considerations involved in assessing the demand for manpower possessing higher education. The issue of demand is discussed at two levels--national and state. In the course of this discussion the various Federal sources available for estimating demand will be considered as will the corresponding sources of state demand information. In developing the demand projections which are used in other parts of this report, especially with regard to the format of supply data, various changes in format and extrapolation of statistics have been employed. These operations will be explained and noted as they are introduced throughout this chapter.

Demand projections for higher educated manpower possesses several unique characteristics which warrant special note. These characteristics relate to the definition of the subject and to the unique properties possessed by these occupational areas in comparison to traditional economic supply and demand analysis.

The most immediate questions are those of definition. What are the specific occupational areas for which one should assemble supply/demand relationships? What constitutes a "program" of higher education? The answer to the first question is dependent upon answering the second. Higher education can be defined from a number of perspectives. In its most applied definition, higher education can consist of almost any training occuring at a post-secondary level. Conversely, it can be defined to exclude a great

many specified occupational programs and to include only programs in the traditional liberal arts and sciences. This latter listing would exclude the programs offered in the state technical colleges as being too occupational and restrictive in their educational array. The definition underlying this study lies between the two extremes. At one pole the most generous definition of higher education would yield a nearly unmanageable array possessing few common characteristics by which a system of measurement could be constructed. Additionally, difficulties in monitoring both supply and demand would further reduce the value and add to the clumsiness of utilizing such a definition. At the other pole, utilization of the very limited definition is plainly an unreasonable restriction, in that it would exclude not only a large part of the educational apparatus but it also would eliminate many areas for which supply and demand analysis yields many of its most valuable conclusions.

For the purposes of this report, higher education includes all educational programs which lead to at least an associate degree and therefore involve at least a two-year course of study. This definition is admittedly quite arbitrary but is nevertheless not without logical support. If one considers that a primary application of supply and demand analysis is to be able somehow to avoid futile training of manpower and conversely to avoid serious shortages of manpower aggravated by long training lags, it is rational to limit the scope to occupations where a potential training lag exists. Educational programs in which the elapsed time is less than that required to obtain an associate degree may encompass a training interval which is too significant in time and utilization of educational resources to warrant the research expenditure necessary to obtain the relevant data. Indeed,

even if such data is gathered the results stand vulnerable to misinterpretation if considered concurrently with projections for occupations requiring several years of higher education.

The limitations imposed upon the gathering of demand statistics are also justifiable on pragmatic grounds. Demand statistics alone are of little value unless they can be corresponded to supply statistics. As was indicated in Chapter III, the discussion of matrices and interfaces, there are distinct limitations as to the types of degree-conferred data available. For a large part of the less-structured or skill-training post-secondary programs there are no sources of output statistics.

Even in the areas that are being considered this lack of data has not been wholly remedied. For example, a large number of two-year associate degree programs lose a substantial part of their enrollment before degrees are awarded. Does this mean that the dropout portion is not to be counted as entering the supply function of the given educational/occupational channel? The answer is uncertain, for indeed many of these individuals may never again have anything to do with the area for which they were training. As will be shown in the case study concerning the output of the state technical colleges, many of the students who drop out do so in order to enter the very profession or occupation for which they were training. This means that although dropouts have entered the labor force in the occupational categories corresponding to their academic programs, their existence has not been accounted for in the output statistics. This miscounting occurs conversely, however, insofar as supply is being determined in terms of qualified graduates in a given discipline. Such a measurement makes no adjustment for those graduates who major in a given area but never utilize

that training. As follow-up studies of graduates show, there are a number of academic areas--some quite closely oriented towards occupations--in which a substantial number of graduates do not enter the corresponding professional areas.

The selection of categories for which supply and demand statistics would be gathered bears the mark of these considerations. In general, the objective was to select those categories where the cross-reference was not only most direct but also most consistent. For example, selections of the category "Engineers" was based on the following characteristics of engineers and engineering professions:

a. The qualifications for engineers are reasonably standardized. One must usually be a graduate from an accredited engineering program in order to gain entrance into the profession, although it is noteworthy that in recent times of shortage there appears to have been a substantial upgrading of industrial technicians.

b. The sources of supply of engineers are established and such output is measurable.

c. There are very few matrix channels which an engineer can follow. Entering almost any field of endeavor other than engineering would represent a substantial waste of the educational investment and experience.

In general, then the selection of demand categories is fairly arbitrary and should not be misconstrued as a listing of all occupations which drew upon higher-educated manpower. No attempt has been made, for instance, to assess the demand for English majors insofar as the number of occupations involved would be numerous. There may not even be a consistent pattern of occupation election by graduates in English. This latter consideration

is discussed at some length in Chapter III.

Demand statistics related to higher education are further complicated by the fact that market forces affect this segment of manpower. The response of the labor pool to these forces is in many ways different from interplay of market forces about other demand goods, whether manufactured items or even other types of occupations.

Traditional supply and demand analysis concerns a quantity response of a given item to varying price levels. If demand for a given item rises exogenously, price increases, which in turn prompts greater production. Correspondingly, as the price increases, the consumer is inclined to cut back his demand in response to the higher price levels. The process which balances supply with demand at an equilibrating output level is the basic equilibrium function of supply/demand analysis.

Unfortunately, when these basic relationships are applied to higher educated manpower, they are often distorted or broken down by secondary pressures which do not occur in orthodox economic analysis. Most of the difficulties can be traced to the nature of this manpower. The supply of educated manpower available at any given time is only loosely related to what the market wishes or is even willing to pay.

The amount of educated manpower output supply to the market is not instantaneously responsive to the amount sought, for two major reasons.

First, the lag times involved in educating the manpower make it only coincidental if the supply in a given year matches the demand. For example, the quantity of engineers who begin their education today will not enter the market until at least four years from now, while during that time the demand function can and most likely will alter. Adequate supply

to meet that future demand function requires knowing today what that demand will be and planning enrollments accordingly. Admittedly, trying to anticipate that future demand a highly risky undertaking.

Secondly, the supply of, e.g., engineers already educated and employable does not vary significantly with short-run changes in demand. As has been demonstrated, future supply is limited maximally by the training output lags inherent in the system. The minimum supply is also "sticky downward" to a large extent because of the extensive educational investment skilled engineers have made in their occupation. Also, exerting pressure is the intangible human element of individuals sticking with their profession even through times of slackened demand. As the U. S. Department of Labor publication, College Educated Workers, 1968-80, states:

> Supply and demand in this bulletin are not discussed in the usual economic sense in which wages play a major role in equating supply with demand. The long training period required to enter professional and technical occupations prohibits the immediate adjustments normally associated with the terms supply and demand.[1]

Even if it were possible to assess demand functions for particular classes of education workers, this does not mean necessarily that the source of higher educated labor supply (generally, colleges and universities) will adjust their output to attempt to bring supply and demand into relative balance. There are several reasons why this adjustment would not necessarily occur.

First, many institutions have high capital investments in educational plants and in facilities structured rigidly by specific curriculum delineations. In the short run there is often little that can be done to adjust for program imbalances, unless a university is willing to see expensive facilities remain uneconomically empty. Stickiness also applies

to the realm of increased demand. The lag time involved in the construction of new university facilities is such that in the short run it is necessary to make do with existing facilities. To reorient significantly the educational program of a university often requires decades of concerted effort to reallocate the capital investment of the university.

Second, universities basically are limited in what they can teach to what students wish to learn. There is not necessarily a certain cause-and-effect relationship between shortage occupational areas in the economy and students' educational interests as reflected in enrollments. An example of this imperfection is the case of the state technical colleges' programs to train industrial technicians. The supply of technicians has been assessed as severely short of demand within the Connecticut economy. The programsbeing offered in the technical schools are also regarded as being academic programs of high caliber. Yet the technical colleges of Connecticut seem to be suffering from at least a slight case of under-enrollment.[2] This would seem to indicate that merely establishing the demand projections will not necessarily stimulate supply sufficient to meet demand.

The chapter of this report analyzing planned new and discontinued academic programs in Connecticut institutions reveals some interesting aspects of the process of program reorientation in the State. It appears that institutions are responding fairly effectively to certain areas of growth in the projected occupational demand schedule. The area of health professions, for instance, is predicted to undergo continued rapid growth. Correspondingly, it is also an area in which the greatest number of planned new programs is found. However, when it came to reducing program offerings to correspond to lack of net occupational demand, institutions were very

much disinclined to cut back except in the face of severe financial pressures, which may not always be present. The area of teacher education programs is an excellent example of this phenomenon. Even though teachers of all descriptions are in extreme oversupply and will most likely remain so through 1980, almost no efforts have been undertaken to trim the supply of teachers. Indeed, many institutions continue to initiate new, albeit small and highly specialized, teacher education programs. A full examination of this phenomenon is included in that chapter which is concerned with new program plans.

The Federal Government provides the most comprehensive set of specific occupational demand projections available for the United States. The prime agency for these projections is, as may be expected, the U. S. Department of Labor, Bureau of Labor Statistics. Essentially, the Labor Department demand surveys are of two derivations. First and most commonly utilized are those studies associated with a continuous ongoing project related to occupational outlook. These studies are usually surveys of single occupations, in which the particular area of demand is considered independently from the rest of the economy. The entire set of these projections is used to comprise the Occupational Outlook Handbook which purports to be a guide to the future growth of occupations. The second source of Federal demand information is an econometric model which accommodates the entire civilian economy of the nation. In this model, all occupations are considered in relation to one another and in relationship to the industrial composition of the nation. Indeed, occupational demand figures originate from projections of industrial employment.

Both of these projection systems yield results which can be utilized in establishing at least the nation's demand functions for various types

of higher educated manpower. The use of these statistics is generally limited in that they have not been compiled in a manner which makes them comparable to Federal surveys designed to measure educational output. The one exception to this lack of relating supply to demand is found in the aforementioned Department of Labor publication, College Educated Workers, 1968-80. (This bulletin and its limitations will be discussed shortly when the summation of its relevant data is introduced.) Labor Department surveys are hampered on another count in that their systems of classification are not always standard and, therefore, often are inconsistent. The Labor Department, additionally, has often surveyed fragments of occupational categories and, thus, has rendered difficult any attempt to correlate the larger supply categories.

As has been indicated, there are two alternative systems for classification of occupations. One system is the list of Census Bureau titles; this has been utilized in the construction of the industry/occupation matrix referred to earlier. The other system is based on the Dictionary of Occupational Titles which is termed the standard system of occupational classification for the United States. The Occupational Outlook Handbook is based on this system and its entries bear D.O.T. title numbers. Unfortunately, this standard system has not yet been adopted by the rest of the Labor Department, which retains the Census Bureau system. Although the two systems are roughly comparable, the translation table between the two is often cumbersome, clumsy, and confusing. Also, key differences exist in the very areas which are most pertinent to higher education supply and demand.

The material presented in Table V-1 is drawn off the conclusions of the industrial/occupational matrix referred to previously. The listing of

categories on this table is far from complete and has been circumscribed by the criteria determining the scope of this report. The somewhat arbitrary listing of but some component units of main headings was necessitated by the need to relate these various components to supply functions presented elsewhere in this report.

The Bureau of Labor Statistics industry/occupation matrix (Tomorrow's Manpower Needs) is a highly complex study covering four volumes of results each with substantial methodological sections. Readers seeking a more complete explanation of this matrix are advised to consult either its preliminary report entitled Occupational Employment Patterns for 1960 and 1975 (Bureau of Labor Statistics Bulletin 1599) or the final four volume study.

Table V-2 is drawn off College Educated Workers, 1968-80. The data in this bulletin represents the Labor Department's alternative method of collecting demand information. In utilizing this survey in comparison with the industry/occupation matrix, many of the difficulties mentioned earlier appear. It should be indicated that this alternative method is not completely divorced from the industrial/occupational matrix. Rather, the results of that matrix serve as one source of input for arriving at judgmental projections for specific occupational areas considered or disaggregate components of the economy.

The inconsistencies of titling are revealed when one compares category titles used for Table 1 and those used for Table 2. College Educated Workers, 1968-80, for instance, introduces an aggregated category "Life Scientists" which does not appear in any of the Census Bureau listings utilized in the industry/occupation matrix. This category does exist,

however, in the Occupational Outlook Handbook and as such it is a D.O.T. title.

The inconsistencies of titling are somewhat inconvenient but are not insurmountable. What represents a more basic difficulty is the lack of agreement between projections offered by the respective sources of Table 1 and Table 2. This lack of agreement is even more surprising considering that the sources of data input for the College Educated Workers, 1968-80, bulletin is other than Tomorrow's Manpower Needs and Occupational Employment Patterns for 1960 and 1975, the source of the Table 1 entries.

Direct comparisons of data over a wide range of categories is difficult because of the previously mentioned inconsistencies of definition. However, there are a number of individual categories in which the numerical discrepancies can be seen. The category "Librarians" provides a good numerical example of this phenomenon. According to Tomorrow's Manpower Needs and the outlook for College Educated Workers, 1968-1980, Library Science will be a rapidly growing field. One then might reasonably assume that the definition of librarians in Tomorrow's Manpower Needs and that in College Educated Workers, 1968-80, are roughly equivalent, given the comparability of the Census and D.O.T. titles in this occupation. Aggregating the two sources reveal a sharp drop in the number of librarians actually employed between 1960 and 1968, a dramatic increase in projected employment in 1975, and yet another significant drop in projected employment in 1980. The reason for this erratic behavior is that the projections given in College Educated Workers for the years 1968 and 1980 are significantly lower than those given in Tomorrow's Manpower Needs for 1960 and 1975. Similar disparities exist in a number of other occupations as well.

In an attempt to reconcile the competing demand studies, Mr. Michael Pilot of the Bureau of Labor Statistics was contacted. (Mr. Pilot is listed as one of the contributors to College Educated Workers.) Mr. Pilot indicated that the discrepancies between the two studies could be explained for the reasons paraphrased as follows:

(a) Tomorrow's Manpower Needs represents a civilian economy from which the military has been excluded.

(b) Sources other than the industry/occupation matrix were employed to adjust listings in particular categories. Generally, it seems that there was heavy input of judgmental information from the Occupational Outlook Handbook, although the O.O.H. was not cited.

Although both of these points are valid, unless some way is provided to statistically account for the discrepancies of the two types of demand projections, attempts to use Labor Department studies as a unified body of demand information are destined to meet with continued difficulty.

T A B L E V-1

SELECTED OCCUPATIONAL AREA PROJECTIONS FOR THE UNITED STATES FOR HIGHER EDUCATED MANPOWER

(Individual line listings are Census categories - indented groups correspond to HEGIS aggregations.)

OCCUPATIONAL GROUP	EMPLOYED 1960	PROJECTED 1975	% CHANGE 1960-75
Engineers (all)	810,000	1,450,000	79
Natural Scientists[a/]	236,600	465,000	97
Physical Scientists	133,000	213,000	60.1
Chemists	91,000	175,000	92.3
Geologists and Geophysists	18,000	29,000	61.1
Physists	24,000	58,000	141.6
Mathematicians	21,000	51,000	142.8
Biological Scientists	60,000	117,000	95
Agricultural Scientists	30,000	53,000	76.6
Biological Scientists	30,000	64,000	113.3
Technicians, Science and Industry[b/]	425,000	920,000	116.4
Medical and Other Health Workers[c/]	1,321,000	2,240,000	70
Dentists	87,000	125,000	43.6
Professional Nurses	27,000	37,000	37
Physicians and Surgeons	496,000	866,000	74.5
Medical and Dental Technicians	141,000	343,000	143.2
Psychologists[d/]	17,000	40,000	135.2
Teachers Elementary	978,000	1,233,000	26
Secondary	603,000	1,100,000	82.4
Lawyers and Judges	225,000	320,000	42.2
Librarians	80,000	130,000	62.5
Architects	30,000	45,000	50

Sources: As explained in Chapter V.

a/ A final component listing of other natural scientists is necessary to make the broad Census sub-heading of natural scientists complete.

b/ This listing bears the Census title, "Other Technicians" - sub-groupings include industrial and commercial technicians.

c/ This aggregated title lacks the sub-titles, Optometrists, Osteopaths, Pharmacists, Veterinarians, Psychologists, and Other Medical and Health Workers.

d/ This total is aggregated into the above title, Medical and Other Health Workers. (See note c.)

TABLE V-2

PROJECTED DEMAND FOR COLLEGE EDUCATED WORKERS
AS PRESENTED BY COLLEGE EDUCATED WORKERS, 1968-80 @

Groups (D.O.T. Titles)	Estimated 1968 Employed	Projected 1980 Requirements	Percent Change
Engineers	1,100,000	1,500,000	40.2%
Chemists	130,000	200,000	55.7%
Mathematicians	70,000	110,000	60.5%
Geologists and Geophysicists	30,000	36,000	20.6%
Physicists	45,000	75,000	63.9%
Life Scientists	168,000	238,000	40.8%
Physicians	295,000	450,000	53.1%
Teachers: Elementary and Secondary	2,170,000	2,340,000	7.8%
Architects	34,000	50,000	47.1%
Lawyers	270,000	335,000	22.7%

@ BLS Bulletin 1676

Demand Information and the State of Connecticut

The following charts are based wholly on information about projected occupational demand in Connecticut supplied by the Connecticut Labor Department and presented in its publication, Occupational Outlook 1968-1975. This publication represents the only comprehensive source of specific demand figures for educated manpower available for the State at present.

The basis of the Occupational Outlook is the national matrix, Tomorrow's Manpower Needs from which State and regional data can be extracted. The Connecticut Labor Department has adjusted this data to derive the projections set forth in its Occupational Outlook.

The occupational categories chosen for representation in the following tables represent an arbitrary selection which is on the whole comparable to those categories which have been selected for the national demand tables previously introduced. The source for defining titles is the same set of Census titles used in certain Federal projections.

Extrapolation techniques employed. For purposes of this study, the projections available in the State's Occupational Outlook did not project far enough to obtain the long-range forecasts deemed appropriate for purposes of matching occupational demand to the supply of higher educated manpower. It was therefore necessary to extrapolate the data to the year 1980. This represents an extension of the 1975 projection derived by the Labor Department. Additionally, for purposes of reference and consistent reporting periods, a set of figures was interpolated for the year 1970.

Extrapolation of the occupational projection involved determining essentially two numbers for each occupational category. The first of these

was the actual increase or decrease in total job openings from one given year to the projected year. The second figure consisted of the number of job vacancies which would be created through deaths and retirements during a given projected period.

Both of these numbers were obtained using constant rates of increase, relative to the total employed for each given year in the projected period. This method assumes that the economic factors which influenced the projections to 1975 will remain in effect through 1980 as well. It also assumes that both net change in job openings and the number of deaths and retirements can be derived for any given year by using a predetermined percentage rate. The validity of this technique for obtaining approximate projections was verified by contact with Messrs. Roger Skelly and Carrett McDonald of the Connecticut State Labor Department, Bureau of Economic Analysis and Occupational Statistics of the Research and Information Department. This Bureau originally authored the Occupational Outlook and the induviduals contacted were directly involved in the original project.

The appropriate percentage rates to be applied were derived using the interval which had already been projected by the Labor Department. The Labor Department projections were analyzed using as the base interval a period of seven years ranging from December 31, 1968, to December 31, 1975. For the rate of net change, unadjusted for deaths and retirements, the appropriate percentage rate (which when compounded yearly for the seven-year period, yields the net percentage change given by the Labor Department) was obtained. This rate when then applied to the total employment figure for any given year yielded the number employed within the given occupational area for the following year.

The methods by which the death and retirement rate was obtained are somewhat more complicated. The total number of deaths and retirements for the seven-year period (as cited in the Occupational Outlook) was then divided by 7 representing the number of years in the projection period. The resulting number was then assumed to apply to 1972, the middle year in the base range. By calculating the total employment for that middle year, using the percentage rate for net annual change derived earlier, and then dividing this number into the obtained death and retirement number, an annual percentage rate for death and retirement was obtained.

By employing the annual rate of increase in occupations' openings it is possible to calculate net change figures as well as new employment figures for any given year or period. These net change figures when added to the aggregated death and retirement figures for the given period will provide the total number of new entrants who will be required to balance the supply and demand for any given year.

Table V-3 relates the various base numbers used as supplied by the Occupational Outlook, and the rates of change which were obtained for the given categories via the techniques narrated above and various self-explanatory projections.

Tables V-4, 5, and 6 focus on the number of new entrants who will be demanded in 1970, 1975, and 1980 as obtained by the various death and retirement and net change figures and factors.

It should be noted that for given occupations in Connecticut there do exist other sources of demand in the form of in-house surveys. Three such surveys are examined elsewhere in this report in the form of case studies for medical technicians, industrial technicians, and elementary and secondary teachers.

AREA	ACTUAL EMPLD. 1960	ACTUAL EMPLD. 1968	PROJD. EMPLD. 1970	PROJD. EMPLD. 1975	PROJD. EMPLD. 1980	% ANNUAL CHANGE RATE 1968-80	% RATE DEATH & RETMT. 1968-80	CHANGE 1970-75	CHANGE 1970-80	DEATH& RETMT. 1970-75	DEATH& RETMT. 1970-80	ENTRANTS NEEDED 1970-75	ENTRANTS NEEDED 1970-80
Engineers	21,380	31,540	33,137	37,510	42,438	.025	1.35	4,373	9,301	2,410	5,137	6,783	21,221
Natural Sciences	2,660	3,980	4,251	5,170	6,290	.046	1.11	919	2,039	266	589	1,185	2,628
Chemists	1,690	2,420	2,592	3,120	3,705	.035	1.23	528	1,113	177	387	705	1,500
Agricultural	80	110	120	150	187	.045	2.21	30	67	15	34	45	112
Biological	290	466	514	640	817	.051	.98	126	303	14	33	140	336
Geologists &Geophysicists	40	60	63	70	78	.023	----	7	15	-----	------	------	------
Mathematicians	140	250	273	340	424	.045	.46	67	151	7	16	74	167
Physicists	350	590	632	750	890	.035	.84	118	258	114	150	132	408
Technicians(Science&Industry)	8,160	12,230	13,101	16,812	19,967	.035	3.64	3,711	6,866	2,647	5,790	6,358	12,656
Medical&Other Health Fields	24,500	32,390	34,697	41,160	48,885	.035	4.16	6,463	19,073	8,011	17,525	14,474	36,598
Dentists	1,740	2,070	2,153	2,370	2,616	.025	2.81	217	457	324	692	541	1,149
Dietitians&Nutritionalists	510	620	639	690	743	.015	5.21	51	104	174	328	225	432
Nurses Professional	12,210	15,900	17,032	19,910	23,646	.035	5.15	2,878	6,614	4,868	10,650	7,746	17,264
Physicians&Surgeons	4,270	5,420	5,806	6,780	8,052	.035	2.80	974	2,246	902	1,973	1,876	4,219
Psychologists	220	380	415	520	648	.045	1.57	105	233	37	84	142	317
Technicians-Medical&Dental	2,400	4,110	4,662	6,310	8,645	.065	4.40	1,648	3,983	1,097	2,599	2,745	6,582
Teachers Elementary	14,820	20,900	20,726	20,270	19,851	.004	4.80	-456	-875	5,037	10,179	4,581	11,054
Teachers Secondary	8,680	13,990	14,555	15,980	17,643	.020	3.42	1,425	3,088	2,642	5,560	4,067	8,648
Lawyers & Judges	3,760	4,300	4,397	4,660	4,928	.011	3.18	263	531	723	1,487	986	2,018
Librarians	1,680	2,440	2,495	2,640	2,791	.011	5.20	145	246	671	1,380	816	1,626
Architects	630	770	797	870	949	.018	2.77	123	202	116	243	239	445
Accountants&Auditors	7,820	9,320	9,507	9,920	10,502	.010	2.50	483	995	1,223	2,535	1,706	3,530

TABLE V-3

TABLE V-4

CONNECTICUT

NEW ENTRANTS REQUIRED FOR SELECTED OCCUPATIONAL AREAS

-1970-

Area	Total Employed	Net Change in Total Employed	Deaths & Retirements	Total Number of New Entrants
Engineers	33,137	808	447	1,255
Physical Scientists	3,237	110	37	147
Chemists	2,542	88	32	120
Geologists & Geophysicists	63	1	-	1
Physicists	632	21	5	26
Mathematicians	273	12	1	13
Biological Scientists	640	29	5	34
Agricultural Scientists	126	5	3	8
Biological Scientists	514	24	2	26
Technicians, Science & Industry	13,101	443	476	919
Medical & Other Health Fields	23,847	1,099	1,305	2,404
Dentists	2,153	42	60	102
Professional Nurses	17,032	576	877	1,453
Physicians & Surgeons	5,806	196	163	359
Medical & Dental Technicians	4,662	285	205	490
Psychologists	415	18	7	26
Teachers, Elementary & Secondary	32,281	203	1,498	1,698
Elementary	20,726	(80)	998	918
Secondary	14,555	283	497	780
Lawyers & Judges	4,390	49	140	189
Librarians	2,495	28	130	158

CONNECTICUT

NEW ENTRANTS REQUIRED FOR SELECTED OCCUPATIONAL AREAS

-1975-

Area	Total Employed	Net Change in Total Employed	Deaths & Retirements	Total Number of New Entrants
Engineers	35,510	916	506	1,422
Physical Scientists	3,940	132	44	176
Chemists	3,120	105	38	143
Geologists & Geophysicists	70	2	-	2
Physicists	750	25	6	31
Mathematicians	340	15	2	17
Biological Scientists	790	36	6	42
Agricultural Scientists	150	6	3	9
Biological Scientists	640	30	3	33
Technicians, Science & Industry	16,812	569	612	1,181
Medical & Other Health Fields	35,320	1,333	1,560	2,893
Dentists	2,320	46	67	113
Professional Nurses	19,910	673	1,025	1,698
Physicians & Surgeons	6,780	229	190	419
Medical & Dental Technicians	6,310	385	278	663
Psychologists	520	22	8	30
Teachers, Elementary & Secondary	36,256	229	1,502	1,731
Elementary	20,270	(83)	956	873
Secondary	15,986	312	546	858
Lawyers & Judges	4,660	52	148	200
Librarians	2,640	29	137	166
Architects	870	15	24	39

TABLE V-6

CONNECTICUT
NEW ENTRANTS REQUIRED FOR SELECTED OCCUPATIONAL AREAS

-1980-

Area	Total Employed	Net Change in Total Employed	Deaths & Retirements	Total Number of New Entrants
Engineers	42,438	1,035	573	1,608
Physical Scientists	4,673	157	47	210
Chemists	3,705	125	40	171
Geologists & Geophysicists	78	2	-	2
Physicists	890	30	7	37
Mathematicians	424	18	2	20
Biological Scientists	1,004	47	8	55
Agricultural Scientists	187	8	4	12
Biological Scientists	817	39	4	43
Technicians, Science & Industry	19,967	675	727	1,402
Medical & Other Health Fields	42,959	1,651	1,897	3,448
Dentists	2,616	51	74	125
Professional Nurses	23,646	800	1,218	2,018
Physicians & Surgeons	8,052	272	225	497
Medical & Dental Technicians	8,645	528	380	808
Psychologists	648	27	10	37
Teachers, Elementary & Secondary	37,494	229	1,521	1,740
Elementary	19,851	(84)	976	892
Secondary	17,643	313	545	848
Lawyers & Judges	4,928	55	157	212
Librarians	2,791	31	145	176

NOTES FOR CHAPTER V

1 Bureau of Labor Statistics 1676, p. 1

2 H. Bandes, Demand and Supply: Industrial Technicians in Connecticut 1969-1975, pp. 2-3

CHAPTER VI

CONCLUSIONS:

A MANPOWER SUPPLY AND DEMAND INTERFACE FOR CONNECTICUT

1970, 1975, 1980

Using a methodology described in previous chapters, projections of supply and demand for selected occupations requiring varying degrees of higher education have been developed. The casual reader should again be cautioned that the accuracy of the projections of supply and demand is tempered by the use of aggregated data to arrive at an interface of educational programs and occupational fields.

Because this report is essentially a pilot study, many arbitrary decisions have been made regarding viability of data and scope of concern. For example, these figures in no way account for the phenomenon of migration. Among the forms which migration can assume are the employment in another state of a graduate of an institution in Connecticut, and the employment in Connecticut of an individual who graduated from an out-of-state institution. The significance of migration is reflected in the fact that in 1970, Connecticut experienced a net educational out-migration of more that 14,000 undergraduates. Another economic phenomenon which this study purposely ignores is intra-occupational mobility, in which an individual assumes a position beyond his ostensible formal education qualifications as a result of on-the-job training and experience.

The supply projections herein reflect the application of overall growth rates to the present mix of educational institutions. Hence, such extraordinary growth as that represented by the anticipated completion of the

University of Connecticut Health Center is not necessarily reflected in the projections of graduating students.

Demand projections are based on an Occupational Outlook published by the Connecticut Labor Department, which noted the following assumptions as influencing their model:

(1) The Vietnam war will have ended and "moderate" economic conditions will be in existence;

(2) Connecticut's population level will reflect a gradual reduction in the current rate of in-migration and a moderate increase in the birth rate;

(3) The occupational structure of Connecticut's industry will change in a way similar to that of the nation as a whole; and

(4) Connecticut's age distrubutions and working life experience will be essentially the same as those in the nation as a whole.

Thus, this supply/demand interface represents a comparison between the number of graduates produced by an expanding higher education system and the anticipated number of jobs offered by Connecticut's economy. To term the differences between these two figures as "undersupplies"or "oversupplies" would be somewhat presumptuous. However, the figures derived and presented in tabular form in Tables VI-5, 6, and 7 are a valid basis for a qualitative assessment of the projected supply and demand status of a selected group of occupations.

Considering that the above caveats influence the figures used to derive the qualitative assessments, the following discussion of selected occupations is offered:

Engineers. The sources utilized in this project indicate that Connecticut institutions will continue to graduate fewer engineers than projections indicate will be demanded. Indications are that by 1980, more than one-half

of the demand will be met by Bachelor's in Engineering. Despite the growth of Engineering graduates relative to the projected demand, Connecticut Engineering graduates on all levels will still fall short of the demand in 1980 by approximately 15%.

It should be noted that the Connecticut Occupational Outlook was based on Federal data published prior to the sharp cutback in defense--and space-program spending. However, other federal programs in the future as well as expanded business investment could approximate these earlier conditions. Consequently, the projected demand for Engineering graduates is probably over-stated, especially when the current and much-publicized lack of jobs for Engineering graduates is considered. During the period of expanding demand for Engineers, however, a great deal of upgrading occurred, in which technicians and others with less than a Bachelor's degree in Engineering filled job slots intended for full-fledged Engineers. This upgrading, itself an index of a supply/demand "gap", undoubtedly has distorted the already tight job market for Engineers.

Physical Scientists. The number of graduates in Physical Sciences from Connecticut institutions will continue to exceed the demand for Physical Scientists in the State. Recipients of Master's and Doctor's degrees--those most likely to become professional scientists--exceeded the demand for Physical Scientists about 3% in 1970, a surplus that grows to 50% in 1975 and approximately 57% in 1980. Bachelor's recipients in the Physical Sciences alone exceed the projected demands by a somewhat larger margin than do the recipients of graduate degrees.

Growth in openings for Physical Scientists have diminished throughout the nation as a consequence of the levelling of the growth of aerospace and

defense expenditures. This occupation is also suffering from the current financial constraints throughout the nation upon college and university expenditures.

Mathematicians. The number of openings for Mathematicians in the economy of Connecticut will continue to amount to but a tiny fraction of the graduates in Mathematics in the State's system of higher education. Only 17 and 20 new mathematicians will be demanded in 1975 and 1980, respectively. Graduate degrees awarded in the field alone will total about nine times the number of new openings in each of the two projected years. Needless to say, Bachelor's degrees awarded will even further outstrip the job openings for mathematicians. Baccalaureates will exceed Mathematician demand magnitude by 25 if such a figure is at all meaningful.

Considering that nationally, total openings in private industry for Ph.D.'s in Mathematics in 1968 approximated 1,000, the small numerical growth in the demand for mathematicians in Connecticut is hardly surprising.

Biological Scientists. Supply of graduates in Biological Sciences in Connecticut will continue to far outstrip the demand for these life scientists. Master's and Doctor's degrees totalling seven or eight times the projected demand for Biological Scientists will be awarded in the years 1975 and 1980. Baccalaureates in Biological Sciences will be awarded at about twice the rate of graduate degrees in these fields; this further widens the gap between the number of degree recipients and the number of job openings anticipated in Connecticut in the Biological Sciences.

Although not as severely affected as the physical sciences by cutbacks in defense-related spending, Biological fields are being impinged upon by financial difficulties in higher education. An exogenous source of demand

for Biological Scientists may be in the offing if large Federal programs in health-related fields come to fruition.

Technicians, Science & Industry. The indicated 1970 shortage of Industrial Technicians will ease by 1975, when the number of graduates is expected to approximate the demand for Technicians. By 1980, supply of Technicians is projected as exceeding the demand for Technicians by approximately 30%.

Technicians in Connecticut are primarily graduates of the two-year State Technical Colleges. A continuing growth in the number of Technical College graduates and a consequent lessening of the gap between the supply and demand of technicians in the State will reduce the phenomenon of students leaving the Technical Colleges after one year of training to take positions in industry which ostensibly require two years of technical education. This anticipated effect reflects the lessening importance of upgrading as fully qualified technicians become sufficiently available.

Medical and Other Health Fields. The extreme gap between the number of Connecticut graduates in Medical fields and the demand for these graduates will diminish slightly between 1970 and 1980. Assuming the present mix of Connecticut institutions granting degrees in health fields, an extraordinary gap between the State's supply and demand will remain.

Degrees at the Associate and Bachelor's levels, generally composed of degrees in nursing, medical technology, and health paraprofessions, will total about 20% and 21% of the demand anticipated in 1975 and 1980, respectively. It should be noted that the supply side of the relationship does not include diplomas in nursing granted by hospitals in lieu of an academic degree, nor does it fully account for the anticipated replacement of hospital schools of nursing by additional nursing programs in two-year colleges.

Master's, Doctor's, and First Professional degrees in the category Medical and Other Health Fields will equal about 8% of the demand projected for this group in both 1975 and 1980. These graduate levels include Dentists, Physicians and Surgeons, and Public Health Administrators, and indicate the possible impact which the University of Connecticut Health Center should have upon the supply of medical professionals in the State.

One should note that migration of graduating health professionals is among the highest of any occupation. Since Connecticut is among the states highest in physicians per capita, it is obvious that health professionals have historically in-migrated to the Nutmeg State.

Perhaps noteworthy is that the "Report on New Program Plans" submitted by institutions in Connecticut in 1970-71 include plans for 56 programs in the health field by 1975. Further elaboration of this so-called "Memorandum #10" may be found in Chapter VIII.

Psychologists. The demand for psychologists in Connecticut is projected at about 2/5 the number of graduate degrees to be awarded in the field in both 1975 and 1980. Undergraduate degrees in psychology are expected to exceed the demand for psychologists by a magnitude of more than 20. Demand for new entrants in psychology is expected to total only 30 in 1975 and 37 in 1980.

It is apparent that most undergraduates in psychology will be disappointed if they seek a career as professional psychologists. This field is one example of the dichotomy between the professional orientations of the undergraduate and graduate levels.

Teachers, Elementary and Secondary. The excess of Baccalaureate graduates in Education above and beyond the projected number of new entrants de-

manded in teaching is expected to triple between 1970 and 1980. Bachelor's degrees in Education will total about 178% of the demand for new teachers in 1975 and about 220% of the demand in 1980.

Graduate degrees in Education, particularly at the Master's level, are histrocially equal to the number of Baccalaureates awarded in a given year. The disproportionately large number of graduate degrees in Education as compared to other disciplines seems to reflect the State's requirements for maintaining licensure as a teacher, as well as teachers' desires for higher salaries. Thus, double counting is probably quite characteristic of this category and the anticipated supply might best be measured by either the undergraduate or graduate degrees awarded in a given year.

Institutions have indicated that the much publicized "teacher surplus" is affecting Connecticut as well as the entire nation. It would be reasonable to expect that widespread knowledge of the lack of employment opportunities in teaching will trim the actual number of graduates in education degree programs during the decade; the supply projections herein indicate that the "surplus" will continue to grow if past trends continue. If one considers that liberal arts graduates as well as education graduates tend to enter teaching, the "gap" would be even larger than indicated.

The levelling of demand for teachers reflects demographic trends perhaps more than it reflects the state of the national economy or the finances of state and local governments. It can be stated with virtual certainty that the demographic considerations that are depressing demand for elementary and secondary teachers will affect college faculties beyond 1980.

Lawyers and Judges. A growing margin of law degrees beyond anticipated demand will be awarded in Connecticut throughout the decade. Law degrees will amount to 217% of the 1975 demand and 255% of the 1980 demand.

Similar to health professionals, graduates of law schools tend to have a higher-than-average mobility. The regional and national natures of the two law schools in Connecticut probably tends to overstate the gap between the supply and demand of lawyers and judges within the State.

Librarians. Connecticut will continue to graduate a n insufficient number of librarians to meet projected demands in the field. Recipients of degrees at all levels in the State will only amount to about 49% of the projected demand in 1975 and 57% of the projected demand in 1980.

There is little reason to doubt that opportunities for those entering the library profession will remain strong. One index of the gap between the supply and demand of trained librarians may be the employment of library paraprofessionals trained in one of several community colleges.

Architects. Although the Bachelor's degrees in Architecture awarded by Connecticut institutions will be far below projected demands for Architects in 1975 and 1980, the addition of graduate degrees indicates a sizable surplus of Architecture graduates in the state. Although Bachelor's recipients will fulfill only 26% of the projected demand in 1975 and 28% in 1980, the addition of graduate degree recipients in Architecture brings the total supply of Architects to about 267% and 300% of the demand in 1975 and 1980, respectively.

The somewhat vague professional status of architects hinders an assessment of supply and demand in the field. Confusion of the definition of an Architect and the substantial presence of upgrading in the field muddles the projections somewhat.

TABLE VI-1

Derivation of Education/Occupation Interface
Utilized in Tables VI-2 Through VI-7

Census Category	Specific Occupations Included	New HEGIS Code
Engineers	n.a.	0900 series
Physical Scientists d/	Chemists	1905-1910
	Geologists & Geophysicists	1914
	Physicists	1902-1904
	Other	1900 series
Mathematicians	n.a.	0700 series 1700 series
Biological Scientists d/	Agricultural Scientists	0100 series
	Biological Scientists	0400 series
Technicians, Science & Industry	n.a.	5300 series 5400 series
Medical & Other Health Fields a/	Dentists	1204
	Professional Nurses	1203 & 5208
	Physicians & Surgeons	1206
	Medical & Dental Technicians	All 1200 & 5200 except those cited above
Psychologists b/	n.a.	2000 series
Teachers, Elementary & Secondary c/	n.a	0800 series
Lawyers & Judges	n.a.	1400 series
Librarians	n.a.	1600 series
Architects	n.a.	0200 series

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a/ Excludes "Dietitians & Nutritionalists".

b/ Listed by Census Bureau under category of "Medical & Other Health Workers."

c/ Includes only those graduates with primary degrees in "Education".

d/ Not a Census Bureau category; may be found in D.O.T.

TABLE VI-2

DEGREE OUTPUT BY SELECTED OCCUPATION
CONNECTICUT 1970

	Associate	Bachelor's	Master's (incl. 6th)	Doctor's	First Professional
ssional, technical and dred; and managers, offi-ls and proprietors	2,104	11,075	4,531	511	448
ineers	-	489	333	50	-
sical Scientists	-	239	78	74	-
nematicians	-	314	65	22	-
logical Scientists	-	518	172	74	-
nicians, Science & lustry	428	-	-	-	-
cal & Other Health Fields	37	358	78	2	83
hologists	-	572	21	22	-
hers, Elementary & ondary	-	2,365	2,217	35	-
ers & Judges	-	-	17	10	218
arians	-	22	42	-	-
itects	-	8	72	-	-
r professional, tech-l, and kindred; gers, officials, and rietors; and unclassified	1,639	6,190	1,436	222	147

TABLE VI-3

DEGREE OUTPUT BY SELECTED OCCUPATION
CONNECTICUT 1975

	Associate	Bachelor's	Master's (incl. 6th)	Doctor's	First Professiona
Professional, technical and kindred; and managers, officials and proprietors	5,573	14,160	6,034	747	751
Engineers	-	722	317	66	-
Physical Scientists	-	309	138	126	-
Mathematicians	-	425	113	32	-
Biological Scientists	-	622	243	97	-
Technicians, Science & Industry	1,134	-	-	-	-
Medical & Other Health Fields	98	455	102	4	127
Psychologists	-	698	37	37	-
Teachers, Elementary & Secondary	-	3,073	2,908	51	-
Lawyers & Judges	-	-	22	14	398
Librarians	-	27	55	-	-
Architects	-	10	94	-	-
Other professional, technical, and kindred; Managers, officials, and proprietors; and unclassified	4,341	7,819	2,005	320	226

TABLE VI-4

DEGREE OUTPUT BY SELECTED OCCUPATION
CONNECTICUT 1980

	Associate	Bachelor's	Master's (incl. 6th)	Doctor's	First Professional
ssional, technical and dred; and managers, offi- ls and proprietors	8,905	17,578	7,487	931	932
gineers	-	897	393	81	-
sical Scientists	-	383	172	157	-
hematicians	-	527	139	40	-
logical Scientists	-	772	301	120	-
hnicians, Science & dustry	1,812	-	-	-	-
ical & Other Health Fields	156	564	127	4	157
chologists	-	867	46	46	-
chers, Elementary & condary	-	3,815	3,610	63	-
yers & Judges	-	-	28	18	494
rarians	-	33	68	-	-
hitects	-	12	117	-	-
er professional, tech- al, and kindred; agers, officials, and prietors; and unclassified	6,937	9,708	2,486	402	281

TABLE VI-5

MANPOWER SUPPLY AND DEMAND INTERFACE FOR CONNECTICUT -- 1970

Occupational Field	1 Demand for New Entrants	2 Supply - Associates & Bachelor's only	3 (2)-(1)	4 (2) as % of (1)	5 Supply - Master's, Doctor's & 1st Prof. only	6 (5)-(1)	7 (5) as % of (1)	8 Supply - All Degree Levels	9 (8)-(1)	10 (8) as % of (1)
Engineers	1255	439	(766)	39.0	383	(872)	30.5	872	(383)	69.5
Physical Scientists	147	239	92	162.6	152	5	103.4	391	244	166.0
Mathematicians	13	314	301	2415.4	87	74	569.2	401	388	2984.6
Biological Scientists	34	518	484	1523.5	246	312	723.5	764	730	2147.0
Technicians, Science & Industry	919	428	(491)	46.6	-	-	-	428	(491)	46.6
Medical & Other Health Fields	2404	395	(2006)	16.4	163	2241	6.8	558	(1846)	23.2
Psychologists	26	572	546	2200.0	43	17	165.4	589	563	2265.3
Teachers, Elementary & Secondary	1698	2365	667	139.3	2252	554	132.6	4617	2919	171.9
Lawyers & Judges	189	-	-	-	245	56	129.6	245	56	129.6
Librarians	158	22	(136)	13.9	42	(116)	26.6	64	(94)	40.5
Architects	36	8	(28)	22.2	72	36	200.0	80	44	222.2

TABLE VI-6

MANPOWER SUPPLY AND DEMAND INTERFACE FOR CONNECTICUT -- 1975

Occupational Field	1 Demand for New Entrants	2 Supply - Associates & Bachelor's only	3 (2)-(1)	4 (2) as % of (1)	5 Supply - Master's, Doctor's & 1st Prof. only	6 (5)-(1)	7 (5) as % of (1)	8 Supply - All Degree Levels	9 (8)-(1)	10 (8) as % of (1)
Engineers	1422	722	(700)	50.8	383	(1039)	26.9	1105	(317)	77.0
Physical Scientists	176	309	133	175.6	264	88	150.0	573	397	325.6
Mathematicians	17	425	(408)	2500.0	145	128	853.0	570	553	3353.0
Biological Scientists	42	622	580	1481.0	340	298	809.5	962	920	2290.5
Technicians, Science & Industry	1181	1134	(47)	96.0	-	-	-	1134	(47)	96.0
Medical & Other Health Fields	2893	553	(2340)	19.1	233	(2660)	8.0	786	(2107)	27.2
Psychologists	30	698	668	2326.7	74	44	246.7	772	742	2573.3
Teachers, Elementary & Secondary	1731	3073	1342	177.5	2959	1228	170.9	6032	4301	348.5
Lawyers & Judges	200	-	-	-	434	234	217.0	434	234	217.0
Librarians	166	27	(139)	16.3	55	(111)	33.1	82	(84)	49.4
Architects	39	10	(29)	25.6	94	55	241.0	104	65	266.7

TABLE VI-7

MANPOWER SUPPLY AND DEMAND INTERFACE FOR CONNECTICUT -- 1980

Occupational Field	1 Demand for New Entrants	2 Supply - Associates & Bachelor's only	3 (2)-(1)	4 (2) as % of (1)	5 Supply - Master's, Doctor's & 1st Prof. only	6 (5)-(1)	7 (5) as % of (1)	8 Supply - All Degree Levels	9 (8)-(1)	10 (8) as % of (1)
Engineers	1608	897	(711)	55.8	474	(1134)	29.5	1371	(237)	85.3
Physical Scientists	210	383	173	182.4	329	119	156.7	712	502	339.0
Mathematicians	20	527	507	2635.0	179	159	895.0	706	686	3530.0
Biological Scientists	55	772	717	1403.6	421	366	765.4	1193	1138	2169.0
Technicians, Science & Industry	1402	1812	410	129.2	-	-	-	1812	410	129.2
Medical & Other Health Fields	3448	720	(2778)	20.9	288	(3160)	8.4	1008	2440	29.3
Psychologists	37	867	830	2340.2	92	55	249.6	959	972	2591.9
Teachers, Elementary & Secondary	1740	3815	2075	219.2	3673	1933	211.1	7488	5748	430.3
Lawyers & Judges	212	-	-	-	540	328	254.7	540	328	254.7
Librarians	176	33	(143)	18.8	68	(108)	38.6	101	(75)	57.4
Architects	43	12	(31)	27.9	117	74	272.1	129	86	300.0

CHAPTER VII

CASE STUDIES IN THE APPLICATION OF SUPPLY AND DEMAND ANALYSIS TO THREE SELECTED AREAS OF THE HIGHER EDUCATION - OCCUPATION INTERFACE

This chapter will concern itself with the application of supply and demand analysis to three specific areas of the education occupation matrix: industrial and scientific technicians, medical and dental technicians, elementary and secondary teachers.

The available data pertaining to these areas in Connecticut will be examined. Each of these three areas loosely corresponds to an education/occupation classification within the larger supply and demand interface for Connecticut presented in Chapter VI.

The reader is strongly cautioned that the studies utilized in this chapter should not be regarded as simple extensions of the basic interface developed in the previous chapters. Rather, these specialized studies can only be viewed as an extension of the interface only to the extent that methods of classification and sources of data are comparable. The degree to which the various specialized studies do and do not represent valid extensions will be noted as the various sources of data are introduced.

Industrial and Scientific Technicians

The material pertaining to industrial and scientific technicians represents one of the more coherent bodies of supply and demand statistics available for a specific occupation in Connecticut. Supply and demand studies in this field have been specifically designed to correspond to one another.

Indeed the primary study of engineering technicians available, evaluates the need for technicians in terms of shortage and surplus analysis with regard to present and projected sources of supply.

TableVII-1represents a summary of the data introduced in this current and comprehensive report, The Need for Technicians in Connecticut.[1] The system of classification of technicians utilized in this report is very much an in-house arrangement. There is some inconsistency in this report's classifications from chapter to chapter. The various constituent categories tend to expand and contract in terms of what subgroups are included depending on whether supply or demand is being analyzed. Fortunately, the numerical input remains consistent so that the somewhat flexible classification system employed represents a minor hinderance. Generally, the aggregated technician subcategories being dealt with in this Need report are in at least rough agreement with the Census Bureau's definition of technician as utilized in the Connecticut interface. On the supply side of the relationship, the source of supply utilized in the Need report corresponds exactly to source for supply utilized in the interface. This source of supply is considered to be the output of the technical college system aggregated by major discipline categories.

From a conceptual perspective, the Connecticut interface and the Need report are attempting to measure equivalently defined areas of supply and demand. The extent to which that they are not reaching the same answers reflects differences in methodology.

An examination of the conclusions of the two sets of projections indicates that there are significant discrepancies in certain basic areas. Before comparisons are made, it should be noted that the State Labor

Department's Occupational Outlook projects over a somewhat longer period than does the Technician Need report. This difference is slightly in excess of a year. The most obvious discrepancy occurs in the total of new technicians needed. Whereas the Occupational Outlook projects a demand for slightly under 5,000 new technicians by 1975, the Technician report projects a need of over 8,500. Considering the constituent components of the two demand figures, the area of disagreement is the death and retirement figure given in the Occupational Outlook versus the withdrawal from the profession figure given in the Technician Need report. In the area of actual growth of technician openings and total employment by 1975, the two projections are in very close agreement.

The difficulty in aligning deaths and retirements with withdrawals is plainly a methodological one. Whereas the Technician Needs report includes death and retirements as a component of its withdrawal figure, it is only a component and is aggregated with other components representing other sources of worker exit such as promotion out of the technician field. At this level it is not possible to assess which is the more accurate figure to utilize in order to determine the total demand. Use of the type of comprehensive withdrawal figure advocated in the Technician Needs study may be overstating the demand by virture of double-counting movements from one copy to another as withdrawals when, in actuality, the labor force total remains intact. By the same token the Occupational Outlook may be understating significantly the demand factor because it is neglecting other paths of exit from the profession other than deaths and retirements. It is worthwhile, however, to note that one of the classical tenets of supply and demand analysis is that when demand exceeds supply the price paid for the supply item will rise. This

means that in times of shortage it is reasonable to suppose that the wage rate of technicians would be pushed upward. Such a condition would tend to minimize exit out of the technician field insofar as it would be economically disadvantageous to leave the profession. If this were, indeed, the case one could legitimately expect that withdrawals from sources other than deaths and retirements would be minimal and, therefore, neglected. It is even conceivable that higher wage rates could cause entry into the profession among those who had left it earlier for other reasons. However, as has been indicated in other parts of this report, educated manpower does not always respond in an orthodox manner to the various economic vicissitudes. A proper determination of which of these techniques is most valid must await further study into the question of technician leavers.

Before concluding this discussion of demand projections note should be taken again of the fact that the total growth projected in the Needs Study for the field of technicians is in very close agreement with the number projected in the Connecticut Occupational Outlook. This very well may be a reflection of the somewhat similar philosophy both studies held in estimating expansion of the field. Both studies linked their projections closely to the projected development of the industries which employ technicians. In the case of the Needs report, the survey was based on questionnaires gathered directly from industries employing technicians. In the Occupational Outlook, the basis of data was a national projection applied to Connecticut, but one which was based on an econometric industry/ occupation matrix analyzing the same kind of relationships surveyed by the University of Connecticut questionnaires.

The supply side of technician supply and demand is an area of close agreement between the two reports. This is to be expected in that both

supply functions are considered to be the total degrees awarded by the state technical colleges. Differences would result, therefore, only if this output was predicted differently by the two sources. The Technician Needs report goes directly to the schools and asks them to project their own enrollments, whereas the supply functions in the Connecticut interface is derived by extrapolations of Associate degrees awarded. If the two were in disagreement one would perhaps be more inclined to consider the reports from the schools as more reliable; however, such disagreement is not significant.

A more fundamental question should be directed at both supply functions with regard to the validity of simply considering the supply of technicians as degree recipients of the technical colleges. Although, in general, post-secondary training seems to be the preferred method of entry into the technician labor force, the type of such training is not necessarily limited to two-year technical programs. As the Occupational Outlook Handbook states:

> Other ways in which persons can become qualified for technician jobs are by completing an on-the-job training program, through work experience and formal courses taken on a part-time basis in post-secondary or correspondence schools, or through training and experience obtained while serving in the Armed Forces. In addition, many engineering and science students who have not completed all the requirements for a Bachelor's degree, as well as some other persons having a college education in mathematics and science, are able to qualify for technician jobs after they obtain some additional technical training and experience.[2]

Additionally, with regard to the limits of technicians' qualifications, it should be recognized that in the past times of shortages of engineers, technicians were often upgraded into full-fledged engineering positions.

To summarize the supply functions for technicians as set forth in the two sources, it can be said that although the functions are well defined,

easily comparable, and consistent, there may be a more fundamental problem in that they are simply too limited. This is especially evident when one considers that a number of the dropouts from technical colleges leave in order to enter technical spots in industry. Because these individuals, as dropouts, are not recorded on the output statistics it is highly probable that a major source of technician supply is being neglected.

About technicians in Connecticut the following observations may be made regarding supply and demand: the available demand figures, though not in agreement, do seem to indicate significant growth in the technician field and thus a need for substantial numbers of new entrants. The various supply figures, although in very close agreement, may understate supply function by being too restrictive in the numbers of sources they acknowledge.

Further information about technicians can be derived from Chapter IX of this report, which presents occupational follow-up material and Chapter VIII which deals with new programs planned by institutions of higher education. Both these areas of data are valuable and necessary in order to derive a thorough understanding of technician supply and demand.

Medical Technicians

The second case study presented here concerns the field of medical technology. This, too, is an area in which a relative abundance of information pertaining to future supply and demand is available. However, unlike studies of industrial technicians, the work which has been done concerning medical technicians is hardly what one would call clean supply and demand analysis. Indeed, the primary source for information surveying the projected

occupational needs in health services in Connecticut did not include a simultaneous corresponding survey of supply.

The primary source for the data presented here is Health Service Occupations: Occupational Needs, Educational Requirements,[5] referred to popularly as the "Pinsky Report." The data gathering agency for this report is the same organization which compiled the report on Technician Needs; as may also be expected, the methodologies are similar.

The system of classification utilized in this report is also very much of an in-house system created specifically for this study. As such, the aggregated selection of occupation categories considered is equivalent to no listing in any source of occupational titles. In order to make use of the various projections of specific occupations considered, it is necessary to separate the appropriate occupation descriptions which correspond to listings of Census Bureau subcategories. This operation has been performed for the Census category "medical technician" as utilized in the Connecticut Occupational Outlook, which as previously indicated, is the basis of demand categories and data utilized in the Connecticut education-occupation interface. Once this separation is accomplished, effective comparisons can be made.

The appropriate categories for medical technician as defined in Occupational Outlook along with their corresponding projected demand figures are presented in Table VII. Adjusting the total need of 4,923 for a shorter reporting time characterizing the Occupational Outlook yields 3,829 which is in remarkable close agreement to the Occupational Outlook of 3,830.

From this result one is tempted to state that, when adjusted for differences in definitional structure, the two studies might appear to be generating

consistent conclusions. In view of the rather complex differences between the two systems in methodology employed, one should be strongly cautioned against accepting this view. The methodological differences are fundamental and as such affect all comparison between the two surveys.

The fundamental difference in the Health Manpower survey is a data gathering technique which is neither consistent with the technique employed in the similar study of industrial technicians nor that of the Occupational Outlook. This difference stems from the fact that the Health Manpower survey attempts to assess need as opposed to demand. This is equivalent to asking a health manpower employer how many of a given type of worker he would like to have as opposed to how many he will hire. The difference in the orientation of the survey can yield vastly dispariate results. The case of professional nurses provides an excellent example. The Occupational Outlook projects a seven year demand for nurses of 10,600. The Health Manpower study, when components corresponding to professional nurses are aggregated and adjusted, yield a comparable demand figure of 16,131, a difference of 52%. Thus, it can be observed that the demand side of this set of projections seems to be far from consistent.

Within Connecticut the supply side of the occupation/education interface for medical and health workers seems to be much-talked about but little researched. The Health Manpower study deals with the supply function only to the extent of attempting to determine what are the educational prerequisites for entering health workers. The results obtained were very vague and inconclusive. To be sure, most employers consider some post-secondary training desirable for allied health applicants; but they do not necessarily require it as examination of Health Service Occupations, Part II will

bear out. The formally legislated requirements for the training of most health workers are surprisingly light. Less than 15% of health occupations require licensing. As a result, if one seeks from hospitals a definition of medical technician, different job descriptions and different sets of educational prerequisites are cited.

Universities and colleges in Connecticut seem to sense a forthcoming growth in the training of health manpower for they are planning an extensive number of programs through the master's level for training health manpower. The "Report on Program Plans in Connecticut" indicated that in excess of 75 new programs in health training ranging from the creation of a new medical school to the institution of a number of one-year certificate programs are contemplated. It is possible that after the educational establishment has had an opportunity to stabilize its plans for training health workers, standards will arise and a more coherent supply analysis might be derived.

Elementary and Secondary Teachers

A demographic projection of the need for teachers has been recently prepared by the Connecticut State Department of Education.[6] According to this report, "Educational changes appear to be operating to reduce the ratio of children to teachers and so increase the demand for teachers." Thus, the report's projections are based on a student/teacher ratio of 20:1.

As a result projected new teachers needed for public elementary and secondary schools number 3,112 in 1975-76 and 3,888 in 1980-81. The projections are far above the figures of 1,731 and 1,740 derived from the Connecticut Labor Department's Occupational Outlook. If the Department of

Education's projected needs for teachers are matched against the projections of bachelor's degrees awarded in education as derived in Chapter IV, it would appear that Connecticut's supply and demand for teachers in 1975 and 1980 will be in virtual equilibrium.

However, the Department of Education report projects the need for teachers for 1971-72 at 3,609, which may be contrasted with 2,365 bachelor's degrees in education awarded in Connecticut in 1970. This indicated present shortage of teachers (which ignores the significant factor of migration) contrasts sharply with the current experience of education graduates at the two largest state colleges, Central and Southern Connecticut:

> The mark midway through this summer at Southern was hovering at about one-quarter of the June teaching majors placed in jobs, while Central was reporting about two-fifths of its teaching graduates placed.[7]

Consequently, there is good reason to assume that the demand figures based on the Labor Department's Occupational Outlook are a more realistic projection of the need for teachers in Connecticut than are the Education Department's demand figures. Consequently, the large excess of Education degrees beyond demand for teachers that is indicated for 1975 and 1980 in Chapter VI is probably valid at least in a qualitative sense, if not as a precise quantitative prediction.

TABLE VII-1

SUPPLY AND DEMAND FOR TECHNICIAN MANPOWER

AREAS	(1) Employed June 70	(2) Current Vacancies	(3) Growth To 6/75	(4) Withdrawals Through June 75	(5) Total Needed	(6) Graduates Through 75	(7) Difference (5) - (6)
Chemical	1,155	20	320	342	682	190	492
Civil	410	67	215	148	430	221	209
Data Processing	807	6	190	228	424	620	(196)
Electrical and Electronics	5,506	147	1,541	1,600	3,288	772	2,516
Electromechanical	85	1	37	26	64	66	(2)
Industrial and Aeronautics	3,665	28	344	969	1,341	342	952
Metallurgical	390	13	52	107	172	147	25
Mechanical and Tool	3,486	49	774	1,005	1,828	635	1,193
Nuclear	516	12	35	135	182	71	111
Other	186	4	44	49	91	0	91
TOTAL	16,206	347	3,552	4,609	8,508	3,604	4,904

SOURCE: The Need for Technicians in Connecticut, Connecticut Labor Department

TABLE VII-2

DEMAND PROJECTIONS FOR MEDICAL TECHNICIANS*

OCCUPATION	1967 Employed	Vacancies	Expansion	Replacements	Total
E.E.G. Tech.	43	1	36	50	87
E.K.G. Tech.	102	8	53	92	153
X. Ray Tech.	460	29	214	405	653
Cytotechnician	64	11	41	52	104
Med. Lab. Tech.	950	73	445	716	1,234
Operating Room	236	35	187	182	404
Inhalation Therapist	118	34	123	113	270
Dental Hygienist	595	118	468	753	1,339
Dental Lab Worker	319	56	257	235	598
Pediatric Tech.	99	1	31	99	131
TOTALS	2,986	366	1,860	2,697	4,923

*Source: Health Service Occupations: Occupational Needs and Educational Requirements
Division of Vocational Education, State Department of Education
The Labor Education Center, University of Connecticut, September 1967

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[1] Labor Education Center, University of Connecticut, c. 1970.

[2] Occupational Outlook Handbook, 1970-71 ed., p. 209.

[3] Connecticut Research Commission, Demand and Supply: Industrial Research Technicians in Connecticut 1969-1975, by H. Bandes.

[4] Occupational Outlook Handbook, op. cit., p. 205.

[5] This report was prepared for the Division of Vocational Education of the Connecticut State Department of Education by the Labor Education Center, University of Connecticut, 1967.

[6] Connecticut's Need for New Teachers 1971-1986, Research Bulletin #2, Series 1970-71, June 1971.

[7] New Haven Register, August 22, 1971.

CHAPTER VIII

REPORT ON PLANNED ACADEMIC PROGRAM CHANGES IN CONNECTICUT

Introduction

The following report represents the initial analysis of responses to the Commission for Higher Education's Memorandum Number 10, "Report on Program Plans," pertaining to the survey of planned new and discontinued academic programs within the State's colleges and universities through 1975. This memorandum was first mailed in August of 1970. Its questionnaire is identical in format to an earlier Memorandum (#5) first sent in December of 1967, and published in the Fall of 1968.

Both memoranda had as their purpose the assessment of academic program plans throughout the State with regard to the following criteria: the nature and scope of anticipated program plans, the date about which these plans would become effective, and the number of students who would be involved. A copy of the memorandum response form is attached as Appendix VIII-B. The format of this response form, while valuable for soliciting plans of institutions, presents a number of difficulties as a source for aggregated data. Should the Commission endeavor to conduct further such surveys in the future, a new format for the response form might be of value. A suggested new response form is included with the report as Appendix VIII-C.

All sources of uncertainty in this survey cannot be alleviated by use of a new format, however. The nature of the information sought somewhat dilutes the efficacy of such a survey. In a time of unusual uncertainty

of both an academic and non-academic nature among colleges and universities, a number of institutions have expressed difficulty at conceptualizing the emergence of new programs in a general sense, while many were unable to state with any degree of certainty such items as effective dates and projected enrollments. The extent to which institutions' forecasts of academic programs accurately predict their emergence can be seen by examination of reliability study seeking the degree to which programs projected in the Memorandum #5 survey actually came to pass three or four years hence. This study is included as Appendix A.

The above comments should not be taken as an attempt to disclaim the value of this survey. Rather they should be seen as guides to the usefulness of what information the survey can produce.

The survey itself can be viewed as representing a fairly accurate posture of what the respondent schools were thinking at the time the response form was returned. Great lengths have been taken to provide the most updated information available. Among the data dealt with in this analysis, no information is any less recent than June 15, 1971. Additionally, a substantial amount of follow-up work has been undertaken in order to try to eliminate as much ambiguous "degree not indicated" category in classification has been avoided demonstrates the partial effectiveness of these efforts.

The larger value of this survey is more qualitative than quantitative. Responses represent a fair indication of institutional direction in academic matters even if the scope and level of commitment to the new areas is somewhat uncertain. Because institutions are continuously undergoing changes in orientation this survey recognizes one of its greatest values as a source of feedback to institutions. Future surveys also could continue this feedback process.

In general an attempt has been made throughout this analysis to make it as comparable as is feasible with the information present in the analysis of Memorandum #5. There has been some expansion of the program classification system and a somewhat different format of presentation has been employed. However, in all essential ways the surveys should be comparable.

METHODOLOGICAL NOTES AND SUMMARY OF DATA

The Memorandum #10 survey was first mailed to all institutions of higher education in Connecticut in August of 1970. In June of 1971 follow-up letters were sent once again to all institutions in the State asking for an update on their original response if it had been returned; if it had not a complete response was requested. Follow-up activities continued until a full return was accomplished. Questions regarding individual responses were resolved by means of telephone conversations and personal interviews with respondents.

Before proceeding to a summary of the data, some explanatory notes are in order. The category of classification of "degree not indicated" includes (a) programs which were not listed as leading to specific degrees, (b) programs where the degree involved was not readily evident, or (c) programs where an undiscernable multiplicity of degrees are involved. Exemplifying the latter case is a new "school" within a college or university. It should be noted that all the "degree not indicated" entries can be traced to one institution, the University of Connecticut. In all other cases questions of degree not indicated were satisfactorily resolved through follow-up activities.

The basic unit of analysis is the program. Program, however, is a somewhat loosely defined term. In almost all areas a new program consists of a new course of study leading to a new degree. In cases where a response indicated a new program involving more than one degree, the response was either broken down into its constituent units or was listed under "degree not indicated" if a reliable breakdown was not available.

Briefly, the results of Memorandum #10 may be summarized as follows:

(1) Some 373 new programs in 27 discipline areas from classification scheme encompassing 31 areas are anticipated through 1975.

(2) A total of 21 programs will be discontinued at the Associate and above degree level. Two institutions will either be closed or merged out of existence.

(3) Two hundred and three new programs are planned at the Bachelor's degree level and above.

(4) At the level of Bachelor's degree and above the areas of primary interest in new programs are, in descending order:

   a. Education (22)

   b. Fine and Applied Arts (22)

   c. Health Professions (21)

   d. Social Sciences (20)

   e. Biological Sciences (15)

   f. Letters (15)

(5) At the Bachelor's degree level and above there is no definite direction of new program thrust visible - no group of related disciplines (e.g., "natural sciences") predominates.

(6) At the Associate degree level some 171 new programs are planned for implementation before 1975.

(7) Areas of predominate Associate-level interest are, in descending order:

a. Health Services and Paramedical Technologies (57)

b. Public Service Related Technologies (54)

c. Business and Commerce Technologies (52)

(8) Associate degree programs are the largest single new program area with 171 (45.8%) of the new programs. There are 86 new Bachelor's programs planned (23.0%) and 81 (21.7%) at the Master's level. Doctorates, 6th year certificates, and degree not indicated areas comprise the remaining 35 programs (9.4%).

The material presented in these summary tables represents the aggregated responses from the Memorandum #10 questionnaire. As indicated previously, the basic unit of comparison is the degree program. This unit is far from comparable in all cases, however, since the size of a given new program will undoubtedly vary from institution to institution. Had accurate or even approximate enrollment information been available it might have been possible to set up equivalent units in a more meaningful sense. Unfortunately, such information was not available. Thus, the reader is cautioned not to consider that a given number of programs within a given area are equivalent among themselves, much less in comparison with programs in other areas.

Generally divisions of data have been made somewhat arbitrarily to reflect the following groupings: academic emphasis, type of degree, and control of the sponsoring institution. The tables themselves should be self-explanatory.

Bachelor and Above. At the level of Bachelor's degrees and above there do not seem to be any areas of primary thrust in planning of new programs. Nor do either the independent or public sectors of the system hold a monopoly on any program area. The division is about equal with 89 new programs in 19 discipline areas (out of a possible 24) being planned in the State's independent institutions, while 114 new programs in 16 areas are being planned in the public institutions. At the Baccalaureate and above level, four discipline categories are drawing about ten percent of the new program each: Education (10.8%), Fine and Applied Arts (10.8%), Health Professions (10.3%), and Social Sciences (9.8%). Within the areas of Social Sciences and Fine and Applied Arts the split in programs between public and private institutions is about equal. In the areas of Health Professions and Education the State's public institutions are planning roughly twice the number of new programs planned by the State's private colleges. The remaining 60% of the new programs planned are scattered rather randomly across the remaining twenty discipline categories. Only four categories had no new program plans within them; namely, Agriculture and Natural Resources, Architecture and Environmental Design, Home Economics, and Military Science.

The category "degree not indicated" represented a rather small 5% of the total programs planned at the Bachelor's and above level and even smaller 3% if contrasted with new Associate level programs as well. There was no special discipline concentration among the "degree not indicated" programs.

Two discipline categories warrant special note. In the area of Health Professions it should be observed that the program listings understate the

significance of new programs in this area. The University of Connecticut Health Center is a more substantial undertaking than its specific program listing would indicate. Indeed, within the area of Health there are three "degree not indicated" programs which originate at the University of Connecticut and represent large undertakings equivalent to perhaps several programs each. Examination of individual questionnaires reveals that there is a marked trend for all institutions of higher education to move into the health manpower area with ever-increasing emphasis. Examination of the planned new Associate degree programs verifies this trend. Also, warranting some consideration are the new programs classified under Education. It should be noted that although the number of these new programs is relatively large, it would most likely be inaccurate to state that new teacher training programs have a high priority. First, many of the new education programs are narrowly specialized programs and are aimed at very limited numbers of students. Secondly, many of the education programs are related only peripherally to teaching or represent the continuing education of teachers already trained. Finally, education figures largely among planned discontinued programs. In other words, it is unlikely that the teacher output will be significantly increased by the apparently heavy concentration of planned new education programs.

At the Bachelor's degree level, 86 new programs were planned in some 17 discipline categories. Independent institutions planned new programs at a rate somewhat less than twice that of public institutions (53 to 33, respectively). At this level there are no particular emphases in program distribution other than those noted above.

At the Masters level 81 new programs were being planned in 15 academic areas. At this level public program planning exceeded that of the private sector by a rate slightly in excess of two to one, 56 to 25. There are no unusual cases of distribution, with the possible exception of the 11.1% of programs planned in the physical sciences.

At the Doctorate and Post-Doctorate level, plans for some 18 new programs were indicated in 10 discipline categories. There were no significant concentrations, and it is doubtful whether the numbers themselves are large enough to reflect any meaningful trends if there were.

In the area of new sixth-year programs 8 were being planned, 7 of which were within the public sector and 3 of which were in physical science. Once again the sample is too small to reveal anything of significance.

In the area of "degrees not indicated", there are eleven entries all of which come from the University of Connecticut. As was indicated earlier, many of these programs represent new schools and could be of considerable importance if more information were available.

Associate Level. At the Associate degree level, 171 new programs are planned. Of this number, the overwhelming majority will be started in State public institutions. Only 31 will be started in private two-year colleges with perhaps a half a dozen being planned in private four-year institutions. One hundred and nineteen new programs are being planned in the Regional Community College system, while the State Technical Colleges account for 11. Perhaps 5 other Associate-level programs are being planned in state four-year institutions.

REPORTED NEW PROGRAMS PLANNED AT THE BACCALAUREATE LEVEL AND ABOVE

	Private			Doctorate and Post Doc.	Degree Not Indicated	Public			Doctorate and Post Doc.	Degree Not Indicated	Totals	Total Private	Total Public
	Bachelor	Master	6th Year			Bachelor	Master	6th Year					
0100 Agricultural Natural Resources	-	-	-	-	-	-	-	-	-	-	-	-	-
0200 Architectural and Environmental Design	-	-	-	-	-	-	-	-	-	-	-	-	-
0300 Area Studies	1	1	-	-	-	1	-	-	-	1	4	2	2
0400 Biological Studies	6	1	-	-	-	1	6	-	-	1	15	7	8
0500 Business and Management	4	3	-	-	-	-	1	-	-	-	8	7	1
0600 Communications	2	-	-	-	-	-	-	-	-	1	2	2	1
0700 Computer and Information Sciences	1	1	-	-	-	5	2	-	-	-	9	2	7
0800 Education	2	3	-	2	-	10	2	2	1	-	22	7	15
0900 Engineering	3	2	-	3	-	1	1	-	-	-	10	8	2
1000 Fine and Applied Arts	7	-	1	1	-	4	7	-	1	1	22	9	13
1100 Foreign Languages	1	-	-	-	-	1	5	-	-	-	7	1	6
1200 Health Professions	6	1	-	-	-	3	5	-	3	3	21	7	14
1300 Home Economics	-	-	-	-	-	-	-	-	-	-	-	-	-
1400 Law	-	-	-	1	-	-	-	-	-	-	1	1	-
1500 Letters	6	1	-	-	-	1	4	1	1	1	15	7	8
1600 Library Sciences	1	-	-	-	-	-	-	-	-	-	1	1	-
1700 Mathematics	-	-	-	-	-	-	2	1	1	-	4	-	4
1800 Military Sciences	-	-	-	-	-	-	-	-	-	-	-	-	-
1900 Physical Sciences	2	4	-	-	-	1	5	-	-	1	13	6	7
2000 Psychology	-	1	-	2	-	-	7	3	-	-	13	3	10
2100 Public Affairs and Services	1	2	-	-	-	2	2	-	1	2	10	3	7
2200 Social Sciences	5	5	-	-	-	3	7	-	-	-	20	10	10
2300 Theology	2	-	-	-	-	-	-	-	-	-	2	2	-
4900 Interdisciplinary	3	-	-	1	-	-	-	-	-	-	4	4	-
Totals	53	25	1	10	0	33	56	7	8	11	203	89	115

TABLE VIII-1

TABLE VIII-2

PROGRAMS PLANNED BY AREA AT THE BACHELORS DEGREE LEVEL AND ABOVE

A R E A	NEW HEGIS CODE	TOTAL NUMBER OF PROGRAMS	% OF NEW PROGRAMS AT ALL DEGREE LEVELS *	% OF BACHELORS DEGREE AND ABOVE**
iculture and tural Resources	0100	-----	-----	-----
hitecture and vironmental Design	0200	-----	-----	-----
a Studies	0300	4	1.1	2.0
logical Sciences	0400	15	4.0	7.4
iness and Management	0500	8	2.1	4.0
munications	0600	2	0.5	1.0
puter and formation Sciences	0700	9	2.4	4.4
cation	0800	22	5.9	10.8
ineering	0900	10	2.7	4.9
e and Applied Arts	1000	22	5.9	10.8
eign Languages	1100	7	1.9	3.4
lth Professions	1200	21	5.6	10.3
e Economics	1300	-----	-----	-----
	1400	1	0.3	0.5
ters	1500	15	4.0	7.4
rary Science	1600	1	0.3	0.5
hematics	1700	4	1.1	2.0
itary Sciences	1800	-----	-----	-----
sical Sciences	1900	13	3.5	6.4
chology	2000	13	3.5	6.4
lic Affairs and Services	2100	10	2.7	4.9
ial Sciences	2200	20	5.4	9.8
ology	2300	2	0.5	1.0
erdisciplinary Studies	4900	4	1.1	2.0
AL		203	54.5	100.0

al Degrees Awarded 373
al Degrees Awarded at the
chelor's and Above Level 203

NOTE: Percentage details may not add up to 100.0 because of rounding.

TABLE VIII-3
NEW PROGRAMS PLANNED AT THE BACHELORS LEVEL
BY AREA OF STUDY AND BY PUBLIC AND PRIVATE DISTRIBUTION

AREA	NEW HEGIS CODE	TOTAL PROGRAMS PLANNED	PRIVATE	%	PUBLIC	%	% OF ALL PROGRAMS PLANNED	% OF ALL PLANNED PRIVATE	% OF PLAN PUBL
Agriculture and	0100	-	-	-	-	-	-	-	
Architecture and Environmental Design	0200	-	-	-	-	-	-	-	
Area Studies	0300	2	1	50.0	1	50.0	2.3	1.9	3
Biological Sciences	0400	7	6	85.7	1	14.3	8.1	11.3	3
Business and Management	0500	4	4	100.0	-	-	4.6	7.5	
Communications	0600	2	2	100.0	-	-	2.3	3.8	
Computer and Information Sciences	0700	6	1	16.7	5	83.3	7.0	.9	
Education	0800	12	2	16.7	10	83.3	13.8	3.8	30
Engineering	0900	4	3	75.0	1	25.0	4.6	5.7	3
Fine and Applied Arts	1000	11	7	63.6	4	36.4	12.8	13.2	12
Foreign Languages	1200	2	1	50.0	1	50.0	2.3	1.9	3
Health Professions	1300	9	6	66.7	3	33.3	10.5	11.3	9
Home Economics	1300	-	-	-	-	-	-	-	
Law	1400	-	-	-	-	-	-	-	
Letters	1500	7	6	85.7	1	14.3	8.1	11.3	3
Library Science	1600	1	1	100.0	-	-	1.2	1.9	
Mathematics	1700	-	-	-	-	-	-	-	
Military Sciences	1800	-	-	-	-	-	-	-	
Physical Sciences	1900	3	2	66.7	1	33.3	3.5	3.8	
Psychology	2000	-	-	-	-	-	-	-	
Public Affairs and Services	2100	3	1	33.3	2.	66.7	3.5	1.9	
Social Sciences	2200	8	5	62.5	3	37.5	9.3	9.4	
Theology	2300	2	2	-	-	-	2.3	3.8	
Interdisciplinary Studies	4900	3	3	-	-	-	3.5	5.7	
TOTAL		86	53	xxx	33	xxx	100.0	100.0	10

Note - Percentage details may not total 100.0 because of rounding.

TABLE VIII-4

NEW PROGRAMS AT THE MASTERS LEVEL BY AREA OF STUDY AND BY PUBLIC AND PRIVATE DISTRIBUTION

A R E A	NEW HEGIS CODE	TOTAL PROGRAMS PLANNED	PRIVATE	%	PUBLIC	%	% OF ALL PROGRAMS PLANNED	% OF ALL PLANNED PRIVATE	% OF ALL PLANNED PUBLIC
culture and	0100	-	-	-	-	-	-	-	-
itecture and ironmental ign	0200	-	-	-	-	-	-	-	-
Studies	0300	1	1	100.0	-	-	1.2	4.0	-
ogical Sciences	0400	7	1	14.3	6	85.7	8.6	4.0	10.7
ness and agement	0500	4	3	25.0	1	25.0	4.9	12.0	1.8
unications	0600	-	-	-	-	-	-	-	-
uter and ormation ences	0700	3	1	33.3	2	66.7	3.7	4.0	3.6
ation	0800	5	3	60.0	2	40.0	6.2	12.0	3.6
neering	0900	3	2	66.7	1	33.3	3.7	8.0	1.8
and ied Arts	1000	7	-	-	7	100.0	8.6	-	12.5
gn Languages	1200	5	-	-	5	100.0	6.2	-	8.9
h Professions	1300	6	1	16.0	5	83.3	7.4	4.0	8.9
Economics	1300	-	-	-	-	-	-	-	-
	1400	-	-	-	-	-	-	-	-
rs	1500	5	1	20.0	4	80.0	6.2	4.0	7.1
ry Science	1600	-	-	-	-	-	-	-	-
matics	1700	2	-	-	2	100.0	2.5	-	3.6
ary Sciences	1800	-	-	-	-	-	-	-	-
cal Sciences	1900	9	4	44.5	5	55.6	11.1	16.0	8.9
ology	2000	8	1	12.5	7	87.5	9.9	4.0	12.5
c Affairs Services	2100	4	2	50.0	2	50.0	4.9	8.0	3.6
l Sciences	2200	12	5	41.7	7	58.3	14.8	20.0	12.5
ogy	2300	-	-	-	-	-	-	-	-
disciplinary ies	4900	-	-	-	-	-	-	-	-
TAL		81	25	xxx	56	xxx	100.0	100.0	100.0

- Percentage details may not total 100.0 because of rounding.

TABLE VIII-5
NEW PROGRAMS AT THE DOCTORATE AND POST DOCTORATE LEVELS
BY AREA OF STUDY AND BY PUBLIC AND PRIVATE DISTRIBUTION

AREA	NEW HEGIS CODE	TOTAL PROGRAMS PLANNED	PRIVATE	%	PUBLIC	%	% OF ALL PROGRAMS PLANNED	% OF ALL PLANNED PRIVATE	% OF PUB
Agriculture and	0100	-	-	-	-	-	-	-	
Architecture and Environmental Design	0200	-	-	-	-	-	-	-	
Area Studies	0300	-	-	-	-	-	-	-	
Biological Sciences	0400	-	-	-	-	-	-	-	
Business and Management	0500	-	-	-	-	-	-	-	
Communications	0600	-	-	-	-	-	-	-	
Computer and Information Sciences	0700	-	-	-	-	-	-	-	
Education	0800	3	2	66.7	1	33.3	16.7	20.0	1
Engineering	0900	3	3	100.0	-	-	16.7	30.0	
Fine and Applied Arts	1000	2	1	50.0	1	50.0	11.1	10.0	1
Foreign Languages	1200	-	-	-	-	-	-	-	
Health Professions	1300	3	3	100.0	-	-	16.7	-	3
Home Economics	1300	-	-	-	-	-	-	-	
Law	1400	1	1	100.0	-	-	5.6	10.0	
Letters	1500	1	-	-	1	100.0	5.6	-	1
Library Science	1600	-	-	-	-	-	-	-	
Mathematics	1700	1	-	-	1	100.0	5.6	-	1
Military Sciences	1800	-	-	-	-	-	-	-	
Physical Sciences	1900	-	-	-	-	-	-	-	
Psychology	2000	2	2	100.0	-	-	11.1	20.0	
Public Affairs and Services	2100	1	-	-	1	100.0	5.6	-	1
Social Sciences	2200	-	-	-	-	-	-	-	
Theology	2300	-	-	-	-	-	-	-	
Interdisciplinary Studies	4900	1	1	100.0	-	-	5.6	10.0	
TOTAL		18	10	xxx	8	xxx	100.0	100.0	10

Note - Percentage details may not total 100.0 because of rounding.

TABLE VIII-6
"DEGREE NOT INDICATED" NEW PROGRAMS BY AREA OF STUDY AND BY PUBLIC AND PRIVATE DISTRIBUTION

A R E A	NEW HEGIS CODE	TOTAL PROGRAMS PLANNED	PRIVATE	%	PUBLIC	%	% OF ALL PROGRAMS PLANNED	% OF ALL PLANNED PRIVATE	% OF ALL PLANNED PUBLIC
culture and	0100	-	-	-	-	-	-	-	-
itecture and ironmental ign	0200	-	-	-	-	-	-	-	-
Studies	0300	1	-	-	1	1.0	9.1	-	9.1
ogical Sciences	0400	1	-	-	1	100.0	9.1	-	9.1
ness and agement	0500	-	-	-	-	-	-	-	-
unications	0600	1	-	-	1	100.0	9.1	-	9.1
uter and ormation ences	0700	-	-	-	-	-	-	-	-
ation	0800	-	-	-	-	-	-	-	-
neering	0900	-	-	-	-	-	-	-	-
and lied Arts	1000	1	-	-	1	100.0	9.1	-	9.1
ign Languages	1200	-	-	-	-	-	-	-	-
h Professions	1300	3	-	-	3	100.0	27.3	-	27.3
Economics	1300	-	-	-	-	-	-	-	-
	1400	1	-	-	1	100.0	9.1	-	9.1
rs	1500	-	-	-	-	-	-	-	-
ry Science	1600	-	-	-	-	-	-	-	-
matics	1700	-	-	-	-	-	-	-	-
ary Sciences	1800	-	-	-	-	-	-	-	-
cal Sciences	1900	1	-	-	1	100.0	9.1	-	9.1
ology	2000	-	-	-	-	-	-	-	-
c Affairs Services	2100	2	-	-	2	100.0	18.2	-	18.2
l Sciences	2200	-	-	-	-	-	-	-	-
ogy	2300	-	-	-	-	-	-	-	-
disciplinary ies	4900	-	-	-	-	-	-	-	-
TAL		11	-	xxx	11	xxx	100.0	-	100.0

- Percentage details may not total 100.0 because of rounding.

New Programs at the Associate Level

Unlike programs at the Baccalaureate degree level and above the programs being planned at the Associate degree level have definite centers of focus. Three program areas account for 83.6% of all the Associate programs. They are: Health Services (33.3%), Public Service Related Technologies (31.6%), and Business and Commerce (18.7%). Table A shows the distribution of new programs among all categories with regard to all Associate programs and all programs on all levels.

TABLE VIII-A

NEW ASSOCIATE DEGREE PROGRAMS

HEGIS	A R E A	TOTAL ASSOC. PROGRAMS	% OF ALL NEW PROGRAMS	% OF ASSOC. PROGRAMS
5000	Business and Commerce	32	8.6	18.7
5100	Data Processing Technologies	5	1.3	2.9
5200	Health Services	57	15.3	33.3
5300	Mechanical and Engineering Technologies	9	2.4	5.3
5400	Natural Science Technologies	10	2.7	5.8
5500	Public Services Related Technologies	54	14.5	31.6
5600	General Programs in the Arts and Sciences	4	1.1	2.3
	TOTALS	171	45.9	100.0

Total All New Programs - 373
NOTE: Percentage details may not add to 100.0 because of rounding.

Education at the Associate degree level is definitely in the hands of publicly supported education in Connecticut. Not more than 20% of the new programs leading to Associate degrees are planned by private institutions. Table B breaks down the Associate degree programs by their planning institutions.

T A B L E VIII- B

NEW PROGRAMS PLANNED AT THE ASSOCIATE DEGREE LEVEL

C O L L E G E S	NUMBER PLANNED	% OF TOTAL
Community Colleges	119	69.6
State Technical Colleges	11	6.4
Private Two-Year Colleges	31	18.1
Four-Year Colleges	10	5.8
TOTALS	171	100.0

NOTE: Percentage details may not add to 100.0 because of rounding.

An examination of curriculum areas in which new programs are planned reveals that public institutions are limiting their emphasis almost entirely to technician and paraprofessional training. Independent colleges on the other hand provide a somewhat wider range, particularly in Associate-level programs planned in the liberal arts, although they are planning no new programs in the areas of industrial technology and data processing. Private two-year colleges appear to have a more evenly planned distribution among business, commercial and administrative education as opposed to the more purely technical programs. This may be a reflection of the limited capital resources independent two-year colleges have at their disposal as well as their traditional liberal arts orientation.

Once again, the area of health manpower training receives very strong emphasis in both the public and private sectors, although it is admittedly somewhat muted in the private sphere.

When Associate level plans are taken in conjuction with the programs planned at the level of the Baccalaureate degree and above, some 79 new health programs are being planned against no anticipated deletions. The thrust of planning is evident.

Only seven Certificate programs were reported being planned throughout the State. These seven programs were all in the state technical colleges and they all pertained to technology in industry. This figure may be somewhat understated because some of the programs at the community college level may very well have certificate derivatives; however, none were stated as such. Also, it is possible, though unlikely, that some of the "degree not indicated" plans at the University of Connecticut may be certificate programs.

TABLE VIII-7

PLANNED NEW PROGRAMS
AT THE ASSOCIATE DEGREE LEVEL

AREA	COMMUNITY COLLEGES	PRIVATE TWO-YEAR COLLEGES	STATE TECHNICAL COLLEGES	O T H E R INSTITUTIONS	TOTAL
00 siness and mmerce Technologies	20	9	2	1	32
00 ta Processing chnologies	5	-	-	-	5
00 alth Services d Paramedical chnologies	45	7	-	5	57
00 chanical and gineering chnologies	-	-	9	-	9
00 tural Sciences chnologies	9	1	-	-	10
00 blic Services chnologies	40	11	-	3	54
00 ts and ience or neral Programs	-	3	-	1	4
TOTAL	114	31	11	10	171

TABLE VIII-8

DISTRIBUTION OF PLANNED ASSOCIATE-LEVEL PROGRAMS BY DISCIPLINE

AREA	COMMUNITY COLLEGES	PRIVATE TWO-YEAR COLLEGES	STATE TECHNICAL COLLEGES	O T H E R INSTITUTIONS
5000 Business and Commerce Technologies	16.3%	29.0%	18.2%	10.0%
5100 Data Processing Technologies	4.2%	----	----	----
5200 Health Services and Paramedical Technologies	37.8%	22.6%	----	50.0%
5300 Mechanical and Engineering Technologies	----	----	81.8%	----
5400 Natural Science Technologies	7.6%	3.2%	----	----
5500 Public Service Technologies	33.6%	35.5%	----	30.0%
5600 Arts and Science or General Programs	----	9.7%	----	10.0%
TOTALS	100.0%	100.0%	100.0%	100.0%

NOTE: Percentage detail may not exactly total 100.0% because of rounding.

TABLE VIII-9

DISTRIBUTION OF PLANNED ASSOCIATE-LEVEL PROGRAMS
BY CONTROL OF INSTITUTION

A R E A	COMMUNITY COLLEGES	PRIVATE TWO-YEAR COLLEGES	STATE TECHNICAL COLLEGES	O T H E R INSTITUTIONS	TOTAL
)0 siness and mmerce Technologies	62.5%	28.1%	6.2%	3.1%	100.0%
)0 :a Processing :hnologies	100.0%	------	------	------	100.0%
)0 alth Services l Paramedical :hnologies	78.8%	12.3%	------	8.8%	100.0%
)0 hanical and ineering hnologies	------	------	100.0%	------	100.0%
0 ural Science hnologies	90.0%	10.0%	------	------	100.0%
0 lic Service hnologies	74.1%	20.2%	------	5.6%	100.0%
0 s and ence or eral Programs	------	75.0%	------	25.0%	100.0%

: Percentage detail may not exactly total 100.0% because of rounding.

COMPARATIVE ANALYSIS BETWEEN MEMORANDUM #5 AND MEMORANDUM #10

As has been indicated previously, Memorandum #10 is essentially a duplicate survey of a new program survey conducted in 1967, Memorandum #5. Comparison of the results of both these memoranda should yield valuable information in assessing changes in the direction of planning with the higher education system.

Before this comparison of results is made, however, one should note techniques of analysis which have been changed since Memorandum #5. First, a somewhat different system of classification has been employed for use in Memorandum #10. The classification of Baccalaureate degree programs and above utilizes a somewhat larger scheme than did the original Memorandum #5. The following categories have been added: Architecture and Environmental Design, Area Studies, Communications, Computer and Information Sciences, Letters, Military Science, Public Affairs and Services, and Interdisciplinary Studies. In many cases these new categories were previously listed under a Memorandum #5 grouping of miscellaneous and unclassified fields. Architecture was previously listed under Fine Arts, Computer and Information Sciences was previously listed under Mathematics, Military Science was listed by the old classification system under Law, and Letters corresponds to the earlier category of English and Journalism. One category, Public Affairs and Services, had no specific slot in the old system, but it does not represent a significant number of new programs. Finally, two separate categories under the old classifying system, those of Philosophy & Religion and Theology, have been merged into one Theology category under the new system.

It is the area of Associate degrees that a major classification change has been made. In the analysis of Memorandum #5, Associate degrees were listed in conjuction with all other degrees; so for that matter were certificate-granting programs which better represent the often occupational nature of such education. In general, though, these changes do not represent serious difficulties in comparing the two Memoranda.

The basis for classification system employed in this Memorandum and one which will hopefully be adopted for all subsequent Memoranda, is the Taxonomy of Instructional Programs in Higher Education. This taxonomy is co-authored by the Western Interstate Commission on Higher Education and by the Higher Education Surveys Branch of the National Center for Educational Statistics, Office of Education, HEW. This is the taxonomy which the future Higher Education General Information Survey (HEGIS) data will be based. Utilizations of this system, which also is the basis for a recommended new program plan questionnaire Appendix B, will hopefully become standard for all CHE data pools.

The following represent the important conclusions which can be drawn from a comparison of the two Memoranda:

1. The number of new programs being planned has not changed significantly. In 1968 a total of 370 new programs were planned throughout Connecticut, in 1971 374 new programs were planned.
2. Public institutions continue to plan new programs at a rate of twice that of independent institutions. The public to independent ratio of new plans was 1.74 in 1968 versus 1.97 in 1971.

3. New program emphasis in Health Professions continues to remain strong, with 79 new programs planned in 1971 versus 56 anticipated in 1968.
4. New Programs planned in Education significantly fewer, from 52 in 1968 to 21 in 1971.
5. New programs in Engineering and Related Technologies are being planned at a significantly reduced rate. Thirty-three were planned in 1968 versus 19 in 1971.
6. New programs are anticipated in the Social Sciences at a somewhat reduced rate although a significant number are still being planned - 30 in 1971 versus 48 in 1968.
7. New programs planned in Business and Commerce are continuing at about the same rate.
8. There is a greater spread in program distribution in 1971 than in 1968 when 5 areas accounted for 60% of the new programs. Part of this change may be the result of counting Associate degrees separately, however.
9. Some 23 programs are anticipated as being discontinued as a result of Memorandum #10 response versus one discontinuance as a result of Memorandum #5 response. Additionally, two institutions will be closed or merged out of existence versus one during the Memorandum #5 time period.
10. The thrust of new programs remains at the two-year level with public institutions still dominating this area.

DISCONTINUED PROGRAMS

Memorandum #10 reveals that there are 23 programs scheduled for discontinuance some time during the next five years. Of these twenty-three, twenty-one are in private sector and two are in public institutions. At the level of Baccalaureate degree and above, eleven programs are slated for discontinuance of which all are in private institutions. At the level of Associate degree twelve programs are to be eliminated of which ten are in private institutions and two are in public colleges. In addition, two small schools, one of which awards the Associate degrees only and one of which is a small divinity school, are being closed down completely or merged into another institution, respectively.

A listing of the specific programs being closed down in the discontinuances other than the two school shutdowns are summarized in Tables C and D. It should be noted that the two-year private college specialized almost entirely in fine arts programs whereas the divinity school maintained significant programs only in the Theological field.

T A B L E C

PROGRAMS BEING DISCONTINUED AT THE BACHELORS DEGREE LEVEL AND ABOVE

Program Area		Baccalaureate		Masters		Totals
		Public	Private	Public	Private	
Education	0800	0	3	0	2	5
Fine and Applied Arts	1000	0	1	0	0	1
Foreign Languages	1100	0	2	0	0	2
Letters	1500	0	1	0	0	1
Physical Science	1900	0	1	0	1	2
TOTALS		0	8	0	3	11

T A B L E D

PROGRAMS BEING DISCONTINUED AT THE ASSOCIATE DEGREE LEVEL

PROGRAM AREA	NEW HEGIS CODE	PUBLIC	PRIVATE	TOTAL
Business and Commerce Technologies	5000	1	2	3
Data Processing Technologies	5100	---	---	---
Health Services and Paramedical Technologies	5200	---	---	---
Mechanical and Engineering Technologies	5300	---	5	5
Natural Science Technologies	5400	1	1	2
Public Service Related Technologies	5500	---	2	2
General Programs In Arts and Sciences	5600	---	---	---
TOTALS		2	10	12

In general, there are not enough discontinued programs to be able to draw any definite conclusions. However, by that very fact it can be stated that within the system there does not appear to be any significant movement towards curtailment of any specific disciplines. The relative absence of discontinued programs tends to indicate, as it did in Memorandum #5 when there was only one discontinued program, that educational programs once established tend to be rather intractable. It is also significant to note that it is only in the private sector that program cutting appears to be taking place. This very well could be a reflection of the stringent financial pressures acting on independent institutions

which public schools, in recent years at least, have not had to face quite as directly. Indeed, financial considerations were noted on many Memorandum #10 responses as affecting not only discontinued programs, but also new program plans. Many of the programs which were not carried out as per the Memorandum #5 response seem to have been deferred for what appear to be financial reasons. As the reliability check revealed, private schools had a much lower follow-through rate than did public institutions.

Finally, there seems to be a certain amount of shifting in program emphasis taking place in at least the area of Education. Education as was indicated previously is one of the discipline areas in which a significant number of programs are planned. Yet, it is also one of the largest areas of discontinued programs. An interpretation of this could be revealing in that whereas all the discontinued programs in Education are occuring in the private sector of the State's institutions, more than two-thirds of the new programs are coming from the private sector.

A similar phenomena seems to be taking place at the Associate level in Engineering Technology programs. Five programs are being discontinued in this area, all in the private sector. Yet, all new programs in this field, although relatively small in number (nine Associate programs and seven Certificate programs), are coming from the private sector. However, the caveat remains that the number of discontinued programs, even in these, the largest areas, are so small as to render analysis by discipline distribution questionable.

APPENDIX VIII - A

A REVIEW OF MEMORANDUM #5: THE DEGREE TO WHICH NEW PROGRAMS PLANNED IN 1967 BY INSTITUTIONS OF HIGHER EDUCATION WERE REALIZED OR SUSTAINED

Preface. This memorandum is intended to fulfill one of the specific objectives of the Student Internship in Economic Development; namely, "To review institutions' earlier predictions of academic programs and the degree to which they were realized or sustained." Such a review was suggested by Professor Jon Joyce of Wesleyan University. This review serves as a "reliability check" on the past plans of colleges and universities in Connecticut, and addresses several other objectives. First, the reliability check provides a general guide through which subsequent compilations of institutional program plans (e.g., Memorandum #10) might be assessed more realistically. Secondly, the review perhaps would indicate specific disciplines or degree levels in which an inordinate number of program plans were or were not being realized. Thirdly, the review possibly would illuminate a shift in trends of institutions' academic planning. Finally, the reliability check would serve to indicate the utility of new program plans and means by which such surveys might be modified and improved.

This memorandum is preliminary to a compilation of Memorandum #10 questionnaires, which will include qualitative conclusions as well as recommendations for future surveys of this type. Consequently, it is based upon an incomplete 1970 return of the Memorandum #10 questionnaires which differs from the virtually complete 1971 return utilized in the

body of Chapter VIII. Hopefully, most of the difference between the two bodies of data will be accounted for by the "no response" category, but discrepancies in the data pool remain. Severe time constraints prevented a revision of this Memorandum #5 review which would utilize the 1971 Memorandum #10 data. Nonetheless, this review serves as an adequate guideline to the relationship between institutions' program plans and their fulfillment.

Results. Public institutions appear to have realized a substantially greater percentage of their program plans than have private institutions (approximately 41% and 16%, respectively). (See Table VIII - E). Both groups of institutions continued to plan in 1970 approximately the same percentage (on the order of 20 to 25%) of those programs planned in 1967. Thus, private institutions appear to have allowed nearly twice the percentage of program plans to atrophy than have the public institutions.

Of programs planned by all Connecticut institutions in 1967, approximately 30% were realized in 1969, 23% were still being planned in 1970, and 47% were not mentioned and have apparently fallen from priority.

TABLE VIII - E

Percentage of Program Plans Realized, Sustained, and Not Indicated by institutional control. (Excludes "No Response" Data).

	Planned in 1967, rlzd, by 1969	Planned in 1967 and still being planned in 1970	Not Indicated
Public	41.5%	24.5%	33.8%
Independent	16.2%	21.6%	61.2%
Total	29.6%	23.5%	46.7%

In terms of degree level, Bachelor-level program plans were least-implemented--only about 13.3% of the 45 Bachelor-level program plans included were on-stream in 1969. At the other extreme, 45.4% of the 11 Doctoral-level programs surveyed had been realized at the time. (See Table VIII - F). The substantial realization of Associate-level program plans is also noteworthy.

T A B L E VIII - F

Percentage of Programs Mounted, by Degree Level, in descending order. (Excludes "No Response" Data.)

Doctoral	45.4%
Associate	38.9
Master	29.0
Degree Not Indicated	25.0
Sixth-Year	21.4
Bachelor	13.3

Program plans in the Natural Sciences were more likely to be realized than were program plans in other disciplines. Biological Sciences, Physical Sciences, Mathematics, and Engineering & Related Technologies evidenced a greater proportion of program plans realized than the average figure of about 30% for all programs. On the other hand, the social sciences fared relatively poorly in terms of program plans realized. The categories Psychology, Social Sciences, and Philosophy & Religion included far less than the average 30% of program plans realized. Health professions, numerically the largest single category of new program plans, included a near-average percentage of plans realized.

Table VIII-G

Percentage of New Program Plans Realized, by Discipline, in descending order. (Excludes "No Response" data.)

Biological Sciences	58.3 %
Foreign Languages	50.0
Physical Sciences	38.4
English & Journalism	40.0
Mathematics	35.7
Engineering & Related Technologies	33.3
Education	30.3
Business & Commerce	30.0
Health Professions	29.0
Social Work, Social Administration, Social Welfare	28.5
Psychology	25.0
Social Sciences	22.5
Philosophy & Religion	20.0
Fine Arts	18.7
Miscellaneous	15.3

Agriculture & Forestry, Library Science, Home Economics, Theology -- 00%; Law -- no plans reported.

Methodology

This review is based on Memorandum #5, "Report on New Program Plans (through 1972)," mailed December 1967, and compiled December 1968. The classification by Discipline utilized in Memorandum #5 has been retained. (Except for indicated dates, the format of the Memorandum #5 is identical to that of Memorandum #10, which may be found in Appendix B).

Review of the progress of the various program plans was achieved by placing each forecast program in a given institution in one of four categories:

I. Program actually mounted, according to inventory entitled "Degree Programs in Connecticut's Institutions of Higher Education, 1969-1970 (sic)." (In fact, the title of this inventory is a misnomer, since Memorandum #7, dated 9/18/68, concerned "Fields of Study Being Offered in Institutions of Higher Education in Connecticut, 1968-69").

II. Program still planned, as of Memorandum #10, dated 8/21/70.

III. Program not mounted and not mentioned as planned in Memorandum #10.

IV. Because several institutions, generally in the public sector, failed to respond to the 1970 mailing of Memorandum #10, programs mentioned by these institutions in Memorandum #5 that were not listed in the program inventory (category I) were placed in category IV, entitled "No Response". Thus, samples both including and excluding the "No Response" Data are found in the appendices.

Other statistical problems resulted from the softness of the raw data, and were treated as follows:

1. Because of the technique used in assembling the data of this survey, the total number of new programs considered differs from that of the Memorandum #5 compilation. The difference results from a desire to reduce the magnitude of the "Degree Not Indicated" Category as well as to standardize inclusions of program plans according to HEGIS criteria.

2. In order that percentages calculated on the bases of a small sample of programs planned in a given discipline might not be overemphasized, the sample size (n) in each discipline is provided in Tables VIII -10,-11, and -12.

(n) represents the numbers of programs planned in the discipline in 1967, according to the Memorandum #5 data.

3. The very few instances of planned and unplanned discontinuances of programs were treated on a credit/debit basis in the compilation.

4. Those few programs being planned jointly among institutions in Memorandum #5 were counted once for each participating institution; it should be noted that only one joint program offering in fact was mounted.

5. Data on programs' enrollment figures and dates effective were not utilized in this compilation. Both categories of information were provided too intermittently to be statistically useful. In addition, dates effective were often coupled with the phrase "uncertain," this creating a third date effective category which would severely hamper classification.

Review of 1967 "Reports on Program Plans" (Memorandum #5)

Percentage of Program Plans Realized Sustained, and Not Indicated -- By Institutional Control (Excludes "No Response" Data).

(NOTE: Percentages May Not Total 100.0 Due to Rounding).

Disc. Code	Discipline	# of Programs surveyed (P&I)	Public & Independent			Public			Independent		
			I	II	III	I	II	III	I	II	III
			Realized '69	Planned '70	Not Indctd.	Realized '69	Planned '70	Not Indctd.	Realized '69	Planned '70	Not Indctd.
01	Mathematics	14	35.7	21.4	42.8	66.6	33.3	----	12.5	12.5	75.0
02	Engineering & Related Technologies	12	33.3	16.6	50.0	100.0	----	----	11.1	22.2	66.6
03	Physical Sciences	13	38.4	30.7	30.7	80.0	20.0	----	12.5	37.5	50.0
04	Biological Sciences	12	58.3	16.6	25.0	75.0	25.0	----	25.0	----	75.0
05	Agriculture & Forestry	1	----	100.0	----	----	100.0	----	----	----	----
06	Health Professions	31	29.0	35.4	35.4	38.4	30.7	30.7	22.2	38.8	38.8
07	Fine Arts	16	18.7	23.5	56.2	14.2	28.5	57.1	22.2	22.2	55.5
08	Philosophy & Religion	5	20.0	20.0	60.0	100.0	----	----	----	25.0	75.0
09	English & Journalism	5	40.0	40.0	20.0	100.0	----	----	----	66.6	33.3
10	Foreign Languages	6	50.0	----	50.0	66.6	----	33.3	33.3	----	66.6
11	Psychology	8	25.0	37.5	37.5	25.0	50.0	25.0	25.0	25.0	50.0
12	Social Sciences	31	22.5	22.5	54.8	46.6	26.6	26.6	----	18.7	81.2
13	Education	33	30.3	9.0	60.6	31.5	15.7	52.6	28.5	----	71.4
14	Library Sciences	1	----	----	100.0	----	----	100.0	----	----	----
15	Social Work, Social Administration, Social Welfare	7	28.5	28.5	42.8	----	25.0	75.0	66.6	33.3	----
16	Business & Commerce	20	30.0	25.0	45.0	38.4	30.7	30.7	14.2	14.2	71.4
17	Home Economics	1	----	100.0	----	----	----	----	----	----	100.0
18	Law	--	----	----	----	----	----	----	----	----	----
19	Theology	--	----	----	----	----	----	----	----	----	----
20	Miscellaneous	13	15.3	23.0	61.5	15.3	23.0	61.5	----	----	----
	ALL PROGRAMS	229	29.6	23.5	46.7	41.5	24.5	33.8	16.2	21.6	61.2

TABLE VIII-10

...not Indicated, and Not Responded To -- By Institutional Control (Includes "No Response" Data)
(NOTE: Percentages May Not Total 100.0 Due to Rounding).

Disc. Code	Discipline	# of Programs surveyed (P&I)	Public & Independent				Public				Independent			
			I Rlzd. '69	II Plnd. '70	III Not Ind.	IV No Resp.	I Rlzd. '69	II Plnd. '70	III Not Ind	IV No Resp	I Rlzd.'69	II Actual'70	III Not Ind.	IV No Resp
01	Mathematics	18	27.7	16.6	33.3	22.2	44.4	22.2	----	33.3	11.1	11.1	66.6	11.1
02	Engineering & Related Technologies	12	33.3	16.6	50.0	----	100.0	----	----	----	11.1	22.2	66.6	----
03	Physical Sciences	16	31.2	25.0	25.0	18.7	50.0	12.5	----	37.5	12.5	37.5	50.0	----
04	Biological Sciences	17	41.7	11.7	17.6	29.4	50.0	16.6	----	33.3	20.0	----	60.0	20.0
05	Agriculture & Forestry	1	----	100.0	----	----	----	100.0	----	----	----	----	----	----
06	Health Professions	53	16.9	20.7	20.7	41.5	14.2	11.4	11.4	62.8	22.2	38.8	38.8	----
07	Fine Arts	26	11.5	15.3	34.6	38.4	5.8	11.7	23.5	58.8	22.2	22.2	55.5	----
08	Philosophy & Religion	5	20.0	20.0	60.0	----	100.0	----	----	----	----	25.0	75.0	----
09	English & Journalism	6	33.3	33.3	16.6	16.6	66.6	----	----	33.3	----	66.6	33.3	----
10	Foreign Languages	6	50.0	----	50.0	----	66.6	----	33.3	----	33.3	----	66.6	----
11	Psychology	9	22.2	33.3	33.3	11.1	25.0	50.0	25.0	----	20.0	20.0	40.0	20.0
12	Social Sciences	46	15.2	15.2	36.9	32.6	25.9	14.8	14.8	44.4	----	15.7	68.4	15.7
13	Education	47	21.2	6.3	42.5	29.7	18.1	9.0	30.3	42.4	28.5	___	71.4	----
14	Library Science	5	----	----	20.0	80.0	----	----	20.0	80.0	----	----	----	----
15	Social Work, Social Administration, Social Welfare	15	13.3	13.3	20.0	53.3	----	8.3	25.0	66.0	66.6	33.3	----	----
16	Business & Commerce	33	18.1	15.1	27.2	39.3	19.2	15.3	15.3	50.0	14.2	14.2	71.4	----
17	Home Economics	4	----	25.0	----	75.0	----	----	----	100.0	----	----	100.0	----
18	Law	--	----	----	----	----	----	----	----	----	----	----	----	----
19	Theology	1	----	----	----	100.0	----	----	----	----	----	----	----	100.0
20	Miscellaneous	14	14.2	21.4	57.1	7.1	14.2	21.4	57.1	7.1	----	----	----	----
	ALL PROGRAMS	333	20.4	16.2	32.1	31.2	22.6	13.4	18.5	45.3	15.3	20.5	58.1	5.9

TABLE VIII-11

TABLE VIII-12

Review of 1967 "Reports on Program Plans" (Memorandum #5)
Percentage of Program Plans Realized, Sustained, And Not Indicated -- By Degree Level
(NOTE: Percentages May Not Total 100.0 Due to Rounding).

	# of Programs surveyed	Excluding "No Response" Data			# of Programs surveyed	Including "No Response" Data			
		I	II	III		I	II	III	IV
		Rlzd. '69	Plnd. '70	Not Indctd.		Rlzd. '69	Plnd. '70	Not Indctd.	No Resp
Associate	130	38.9	23.3	37.6	77	23.0	13.8	22.3	40.7
Bachelor	61	13.3	28.8	57.7	45	9.8	21.3	42.6	26.2
Master	75	29.0	27.4	43.5	62	24.0	22.6	36.0	17.3
Sixth-Year	19	21.4	21.4	57.1	14	15.7	15.7	42.1	26.3
Doctorate	13	45.4	9.0	45.4	11	38.4	7.6	38.4	15.3
Degree Not Indicated	35	25.0	10.0	65.0	20	14.2	5.7	37.1	42.8
ALL LEVELS	333	29.6	23.5	46.7	229	20.4	16.2	32.1	31.2

APPENDIX VIII-B

COMMISSION FOR HIGHER EDUCATION

REPORT ON PROGRAM PLANS

PART A. NEW PROGRAMS

Name of Institution _____

Information Supplied by
(Name and Title) _____

A. New Programs Indicate below any schools, colleges, geographic locations, degrees, majors or programs (other than short term) you expect to establish through 1974-75.

Nature, description, comment[a]	Date[a] Effective	Estimated Enrollment by 1975[b]			
		Undergraduate		Graduate	
		Full-time	Part-time	Full-time	Part-time

a Include changes now under discussion, or which have not yet received governing board's approval. In such cases, please mark the effective date as "uncertain."

b Enrollments: Refer only to the specific program being described.

APPENDIX VIII-B

COMMISSION FOR HIGHER EDUCATION

REPORT ON PROGRAM PLANS

PART B. DISCONTINUED PROGRAMS

Name of Institution_____

Information Supplied by
(Name and Title)_____

B. Discontinued Programs Indicate below any schools or colleges, geographic locations, degrees, majors or programs (other than sho term) you expect to discontinue through 1974-75.

Nature, description, comment[a]	Date To be Disctd[a]	Current Enrollment[b]			
		Undergraduate		Graduate	
		Full-time	Part-time	Full-time	Part-t

[a] Include changes now under discussion, or which have not yet received governing board's approval. In such cases, please mark the effective date as "uncertain.

[b] Enrollments: Refer only to the specific program being described.

Suggested Format -- Report on Program Plans

Name of Institution_____ Information Supplied by (Name & Title)_____

Section A -- Programs Offered by Institutions Which Grant a Four-Year Degree and/or Above

(A) HEGIS Taxonomy	(B) Title of Program(s) (Fill in)	(C) New or Discontinued [1]	(D) Credit Status [2]	(E) If (D) was "2", fill in degree level(s) of program [3]	(F) Year in which new program or discontinuance becomes effective	(G) If (D) was "2", list number of graduates expected in 197__	(H) Expected FTE enrollment in 197__
Agriculture and Natural Resources 0100							
Architecture and Environmental Studies 0200							
Area Studies 0300							
Biological Studies 0400							
Business and Management 0500							
Communication 0600							
Computer and Information Sciences 0700							
Education 0800							
Engineering 0900							
Fine and Applied Arts 1000							

Suggested Format -- Report on Program Plans -- continued

(A) HEGIS Taxonomy		(B) Title of Program(s) (Fill in)	(C) New or Discontinued [1]	(D) Credit Status [2]	(E) If (D) was "2", signify degree level(s) of program [3]	(F) Year in which new program or discontinuance becomes effective	(G) If (D) was "2", signify number of graduates expected in 197__	(H) Expected FTE enrollment in 197__
Foreign Languages	1100							
Health Professions	1200							
Home Economics	1300							
Law	1400							
Letters	1500							
Library Science	1600							
Mathematics	1700							
Military Sciences	1800							
Physical Sciences	1900							
Psychology	2000							
Public Affairs and Services	2100							
Social Sciences	2200							
Theology	2300							
Interdisciplinary Studies	4900							

NOTES:
Section A

1 (C) New = 1, Discontinued = 0
2 (D) Non-Credit, Adult Education, Extension = 0, Certificate-Granting = 1, Degree-Credit = 2
3 (E) Associate = A, Bachelor = B, Master (incl. 6th-year) = M, Doctorate = D, 1st Professional = P

N.B.: All questions of classification should be resolved according to the most recent HEGIS form 2300-2.1, "Degrees and Other Formal Awards Conferred".

Suggested Format -- Report on Program Plans -- continued

Section B -- Programs Offered by Institutions Which Grant a Two-Year Degree

(A) HEGIS Taxonomy		(B) Title of Program(s) (Fill in)	(C) New or Discontinued [1]	(D) Credit Status [2]	(E) Year in which new program or discontinuance becomes effective	(F) If (D) was "2", list number of graduates expected in 197__	(G) Expected FTE enrollment in 197__	
Business & Commerce Technologies	5000							
Data Processing Technologies	5100							
Health Services & Paramedical Technologies	5200							
Mechanical & Engineering Technologies	5300							
Natural Science Technologies	5400							
Public Service Related Technologies	5500							
Arts & Science or General Programs	5600							

NOTES:
Section B

[1] (C) New = 1, Discontinued = 2

[2] (D) Non-Credit, Adult Education, and Extension = 0, Certificate-Granting = 1, Associate Degree = 2

N.B.: All questions of classification should be resolved according to the most recent HEGIS form 2300-2.1, "Degrees and Other Formal Awards Conferred".

APPENDIX VIII-C

APPENDIX VIII-C

Suggested Format -- Report on Program Plans -- continued

Section C -- Signify below any new colleges, geographic locations, and miscellaneous program plans not accounted for in Sections A and B.

CHAPTER IX

GRADUATE FOLLOW-UP STATISTICS FOR SELECTED AREAS OF HIGHER EDUCATION IN CONNECTICUT

The following tables represent statistical aggregations of selected academic areas derived from follow-up studies done by two important constituent units of Connecticut higher education, for their graduates in the indicated years. The institutions for which information is presented are the University of Connecticut and the four State Technical Colleges.

In and of themselves, these institutions represent a significant source of supply of the types of higher-educated manpower which have been discussed throughout this report. The State Technical Colleges provide, as has been discussed in the previous chapter, one of the primary sources for new industrial and scientific technicians. The University of Connecticut represents not only one of the largest single accumulations of undergraduates in the state, but also maintains fully one third of the State's Doctorate programs as well as a substantial number of other graduate programs. It is one of the few institutions in the State where a full range of program offerings is maintained.

The reader should be cautioned, however, that in utilizing the material presented it must be born in mind that these institutions and their graduates are not necessarily representative samples of student bodies enrolled in similar programs in other institutions. Indeed, one would expect that an institution such as the University of Connecticut

would tend to send a much smaller percentage of its graduates out of state than does Yale University, for instance. This would only be consistent with the geographical origins of the different student bodies.

No actual attempt has been made to integrate this information into the supply analysis due to the fact that it is admittedly incomplete and not necessarily fully reliable. Rather it is presented for purposes of reference and example.

The types of relationships which can be drawn from these tables are vital components of the supply side for any type of a complete occupational-educational matrix. By examining the percentage of students who enter the working force each year one can determine how many new entrants will actually be made available to fill needs in specific occupations. By examining the rate by which graduates move out of state, which can be derived from surveys such as those presented by the University of Connecticut, the actual available supply figure can be further adjusted.

With regard to professions into which entry occurs from a number of different degree levels it is possible to adjust for potential double counting by utilization of the figures which indicate how many students in a given year continue with further education. Once again, the supply function can be adjusted accordingly.

Finally, the placement data such as presented here may also provide a good indication of the relative strengths of demand in given professions in terms of indicating the propensity of students to enter the profession. One might legitimately expect that areas which had a high

propensity to draw qualified applicants are areas where significant numbers of unfilled jobs are in existence.

With regard to the specific tables presented here, a word pertaining to their sources is in order. The tables which deal with graduates in the selected areas of the liberal arts have as their source the annual placement study prepared by the placement office of the University of Connecticut. These reports are in-house reports and it is only through the gracious cooperation of the placement office that they were available for use. Additionally, it should be noted that these are far from complete studies of University of Connecticut graduating classes. The reports themselves, deal only with those students who have reported their situation to the placement office. Although we were informed at the Placement Office that they should represent reasonably unbiased samples, in many cases the reporting sample is so small as to run the risk of being statistically insignificant. This consideration is what has brought about the aggregations presented of students receiving graduate degrees. Finally the tables presented here only represent small sections of the total amount of information. These tables concern themselves only with a sampling of the areas which were determined earlier in this report to bear a significant correlation with specific occupational areas.

The material relating to technician categories is much more complete and it represents a nearly complete survey of not only all graduates in a given year, but also all of the academic programs offered by the Technical Colleges. Once again, however, aggregations and alterations of the data have been made in order to form a concise pre-

sentation in this chapter. The surveying agency was the Connecticut Department of Education, Vocational Education Division.

Highlights of Graduate Follow-up Surveys

Among senior classes graduating from the University of Connecticut in 1967 through 1970, who joined the labor force, engineers accepting positions in Connecticut ranged from 50% to 72%, nurses accepting in-state positions ranged from 62% to 94%, and teachers accepting positions in Connecticut from 53% to 84%. Over the four-year period, about 70% of Bachelor's in Engineering took jobs upon graduation while about 90% of nursing graduates found such employment. At the graduate levels, of the Master's and Doctorate recipients graduating in 1968 and 1969, about 70% of the Engineers finding employment did so in Connecticut. Unemployment of recent science graduates seems evident.

Of State Technical College graduates from the classes of 1966 through 1970, virtually 50% found immediate employment as technicians while 9% entered the Armed Forces, 35% continued their education full time; about 1% were employed as other than technicians, and the remaining 5% were largely part-time workers, unemployed, or unavailable for surveying. These figures indicate that the occupational feed-through of industrial technicians is very high relative to most other educational disciplines. There is some employment gradation amoung the various technical fields but this does not appear to be significant.

This data, if its collection is expanded throughout the States' institutions of higher education on a standardized basis, would provide

an ideal source for the migration and employability data necessary to a thorough supply demand analysis. The data presented in the following 13 tables represents a preliminary index to such information.

UNIVERSITY OF CONNECTICUT
REPORT ON PLACEMENT OF SENIORS - CLASS OF JUNE, 1967
(a)
AS OF AUGUST 1, 1967

AREAS	NUMBER RECEIVED DEGREES	REPORTED TO PLACEMENT OFFICE		PLACED IN FULL-TIME EMPLOYMENT		CONTINUED EDUCATION		ACCEPTED POSITIONS IN CONNECTICUT	
		ACTUAL	PERCENT(b)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT (d)
Engineers	126	104	83	63	61	32	31	32	51
Chemists	13	8	62	6	75	1	12	2	33
Biological Scientists	77	29	38	9	31	12	41	7	78
Geologists	11	6	55	3	50	2	33	1	33
Mathematicians	66	39	59	20	51	12	31	12	60
Physicists	8	6	75	2	33	4	67	1	50
Nurses	102	93	91		9	4	4	5	62
Dietitions	14	11	79	10	91	--	--	4	40
Teachers	226	163	72	120	74	23	14	95	79

(a) The total of those placed in full-time employment plus those continuing their education may not equal the number who reported to the Placement Office because of military service, marriage, etc., which are not noted in the above columns.
(b) Percentages are rounded off to the nearest whole number.
(c) Based on those reporting to the Placement Office.
(d) Based on those placed in full-time employment positions.

TABLE IX-1

UNIVERSITY OF CONNECTICUT
REPORT ON PLACEMENT OF SENIORS - CLASS OF JUNE, 1968
(a)
AS OF AUGUST 1, 1968

AREAS	NUMBER RECEIVED DEGREES	REPORTED TO PLACEMENT OFFICE		PLACED IN FULL-TIME EMPLOYMENT		CONTINUED EDUCATION		ACCEPTED POSITIONS IN CONNECTICUT	
		ACTUAL	PERCENT(b)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT (d)
Engineers	155	130	84	105	81	15	12	75	71
Chemists	21	14	67	6	43	7	50	4	67
Biological Scientists	107	59	55	21	36	25	42	18	86
Geologists	16	6	38	2	33	--	--	1	50
Mathematicians	50	28	46	19	68	7	25	7	37
Physicists	6	3	50	---	--	2	67	--	--
Nurses	101	61	60	57	93	--	--	50	88
Dietitions	5	2	40	1	50	1	50	--	--
Teachers	246	181	74	149	82	12	7	79	53

(a) The total of those placed in full-time employment plus those continuing their education may not equal the number who reported to the Placement Office because of military service, marriage, etc., which are not noted in the above columns.
(b) Percentages are rounded off to the nearest whole number.
(c) Based on those reporting to the Placement Office.
(d) Based on those placed in full-time employment positions.

TABLE IX-2

UNIVERSITY OF CONNECTICUT
REPORT ON PLACEMENT OF SENIORS - CLASS OF JUNE, 1969
(a)
AS OF AUGUST 1, 1969

AREAS	NUMBER RECEIVED DEGREES	REPORTED TO PLACEMENT OFFICE		PLACED IN FULL-TIME EMPLOYMENT		CONTINUED EDUCATION		ACCEPTED POSITIONS IN CONNECTICUT	
		ACTUAL	PERCENT(b)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(d)
Engineers	147	109	74	89	82	15	14	46	52
Chemists	30	17	57	8	47	8	27	4	50
Biological Scientists	113	55	49	25	46	25	45	18	72
Geologists	19	9	47	4	44	3	33	3	75
Mathematicians	66	35	53	28	80	5	14	20	71
Physicists	7	5	71	4	80	1	20	2	50
Nurses	103	58	57	54	93	--	--	51	94
Dietitions	9	9	100	2	22	4	44	1	50
Teachers	259	160	62	131	82	21	13	105	80

(a) The total of those placed in full-time employment plus those continuing their education may not equal the number who reported to the Placement Office because of military service, marriage, etc., which are not noted in the above columns.
(b) Percentages are rounded off to the nearest whole number.
(c) Based on those reporting to the Placement Office.
(d) Based on those placed in full-time employment positions.

TABLE IX-3

UNIVERSITY OF CONNECTICUT
REPORT ON PLACEMENT OF SENIORS - CLASS OF JUNE, 1970
(a)
AS OF AUGUST 1, 1970

AREAS	NUMBER RECEIVED DEGREES	REPORTED TO PLACEMENT OFFICE		PLACED IN FULL-TIME EMPLOYMENT		CONTINUED EDUCATION		ACCEPTED POSITIONS IN CONNECTICUT	
		ACTUAL	PERCENT(b)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT (d)
Engineers	157	107	73	77	72	13	12	50	64
Chemists	35	14	40	1	7	10	72	1	100
Biological Scientists	100	33	33	9	27	12	36	6	67
Geologists	13	8	62	4	50	3	38	2	50
Mathematicians	77	32	42	15	47	10	31	12	80
Physicists	5	3	66	---	--	2	67	---	---
Nurses	97	57	59	49	86	--	---	42	86
Dietitions	2	2	100	---	--	2	100	---	---
Teachers	298	187	63	135	72	27(1)	14	113	84

(a) The total of those placed in full-time employment plus those continuing their education may not equal the number who reported to the Placement Office because of military service, marriage, etc., which are not noted in the above columns.
(b) Percentages are rounded off to the nearest whole number.
(c) Based on those reporting to the Placement Office.
(d) Based on those placed in full-time employment positions.

(1) Six attended school part-time while working full-time.

TABLE IX-4

UNIVERSITY OF CONNECTICUT
AGGREGATE - PLACEMENT OF MASTER'S STUDENTS -
CLASSES OF JUNE, 1968 AND 1969 AS OF AUGUST 1, 1969(a)

AREAS	NUMBER RECEIVED DEGREES	REPORTED TO PLACEMENT OFFICE		PLACED IN FULL-TIME EMPLOYMENT		CONTINUED EDUCATION		ACCEPTED POSITIONS IN CONNECTICUT	
		ACTUAL	PERCENT(b)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(d)
Engineers	240	96	40	87	90	7	91	61	70
Chemists	23	12	52	2	17	2	7	2	100
Biological Scientists	74	29	39	18	62	9	17	7	39
Geologists	3	2	67	1	50	1	50	1	100
Mathematicians	10	7	70	6	86	-	--	3	50
Physicists	11	2	18	2	100	-	--	--	---
Dietitions	5	1	20	1	100	-	--	1	100

(a) The total of these placed in full-time employment plus those continuing their education may not equal the number who reported to the Placement Office because of military service, marriage, etc., which are not noted in the above columns.
(b) Percentages are rounded off to the nearest whole number.
(c) Based on those reporting to the Placement Office.
(d) Based on those placed in full-time employment positions.

TABLE IX-5

UNIVERSITY OF CONNECTICUT
AGGREGATE - PLACEMENT OF Ph.D. STUDENTS -
CLASSES OF JUNE, 1968 AND 1969 AS OF AUGUST 1, 1969(a)

AREAS	NUMBER RECEIVED DEGREES	REPORTED TO PLACEMENT OFFICE		PLACED IN FULL-TIME EMPLOYMENT		CONTINUED EDUCATION		ACCEPTED POSITIONS IN CONNECTICUT	
		ACTUAL	PERCENT(b)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(d)
Engineers	37	14	38	12	86	1	7	7	58
Chemists	19	14	74	13	93	1	7	3	23
Biological Scientists	32	16	50	15	94	1	6	4	27
Geologists	--	--	---	--	---	--	--	--	--
Mathematicians	4	2	50	2	100	--	--	--	--
Physicists	12	4	33	4	100	--	--	--	--
Dietitions	1	1	100	1	100	--	--	--	--

(a) The total of these placed in full-time employment plus those continuing their education may not equal the number who reported to the Placement Office because of military service, marriage, etc., which are not noted in the above columns.
(b) Percentages are rounded off to the nearest whole number.
(c) Based on those reporting to the Placement Office.
(d) Based on those placed in full-time employment positions.

TABLE IX-6

UNIVERSITY OF CONNECTICUT
AGGREGATE - PLACEMENT OF GRADUATE STUDENTS(1)
CLASS OF JUNE, 1968 AS OF AUGUST 1, 1968 (a)

AREAS	NUMBER RECEIVED DEGREES	REPORTED TO PLACEMENT OFFICE		PLACED IN FULL-TIME EMPLOYMENT		CONTINUED EDUCATION		ACCEPTED POSITIONS IN CONNECTICUT	
		ACTUAL	PERCENT(b)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(d)
Engineers	155	49	32	45	92	4	8	32	71
Natural Scientists	96	40	42	29	72	4	10	12	41

TABLE IX-7

UNIVERSITY OF CONNECTICUT
AGGREGATE - PLACEMENT OF GRADUATE STUDENTS(1)
CLASS OF JUNE, 1968 AS OF AUGUST 1, 1968 (a)

AREAS	NUMBER RECEIVED DEGREES	REPORT TO PLACEMENT OFFICE		PLACED IN FULL-TIME EMPLOYMENT		CONTINUED EDUCATION		ACCEPTED POSITIONS IN CONNECTICUT	
		ACTUAL	PERCENT(b)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(c)	ACTUAL	PERCENT(d)
Engineers	122	61	50	54	89	4	7	36	67
Natural Scientists	92	48	52	34	71	10	21	13	38

(a) The total of those placed in full-time employment plus those continuing their education may not equal the number who reported to the Placement Office because of military service, marriage, etc., which are not noted in the above columns.
(b) Percentages are rounded off to the nearest whole number.
(c) Based on those reporting to the Placement Office.
(d) Based on those placed in full-time employment positions.

(1) Includes both Master's and Ph.D. candidates.

TABLE IX-8

1966-1969 STATE
TECHNICAL COLLEGE GRADUATES ENTERING TECHNICAL PROFESSIONS *

AREA	TOTAL GRADUATES	ENTERED ARMED FORCES		CONTINUED TRAINING FULL-TIME		OTHER OR UNKNOWN STATUS		EMPLOYED AS TECHNICIAN		EMPLOYED NOT TECHNICIANS		PART-TIME OR UNEMPLOYED	
		#	%**	#	%**	#	%**	#	%**	#	%**	#	%**
Chemical	126	8	6.3	48	38.1	8	6.3	61	48.4	0	-	1	0.8
Data Processing	317	32	10.1	92	29.0	18	5.7	167	52.7	4	1.3	4	1.3
Electrical	361	38	10.5	137	38.0	16	4.4	164	45.4	3	0.8	3	0.8
Mechanical	380	23	6.0	166	43.7	8	2.1	177	46.6	5	1.3	1	0.3
Civil	128	12	9.4	51	39.9	5	3.9	60	46.9	0	-	0	-
Tool	207	19	9.2	48	23.2	6	2.9	130	62.8	2	1.0	2	1.0
Electro-Mechanical	48	4	8.3	11	22.9	3	6.2	29	60.4	1	2.1	0	-
Metallurgical	66	6	9.1	21	31.8	7	10.6	32	48.5	0	-	0	-
TOTAL	1,633	142	8.7	574	35.2	71	4.3	820	50.2	15	0.9	11	0.7

* Source - Graduate Follow-Up, Connecticut State Department of Education; represents summary of tables.

** Percentage of Graduates

NOTE: Percentage detail may not total 100.0 because of rounding.

TABLE IX-9

1969 STATE
TECHNICAL COLLEGE GRADUATES ENTERING TECHNICAL PROFESSIONS *

AREA	TOTAL GRADUATES	ENTERED ARMED FORCES		CONTINUED TRAINING FULL-TIME		OTHER OR UNKNOWN STATUS		EMPLOYED AS TECHNICIAN		EMPLOYED NOT TECHNICIANS		PART-TIME OR UNEMPLOYED	
		#	%**	#	%**	#	%**	#	%**	#	%**	#	%**
Chemical	33	1	3.0	22	66.8	1	3.0	9	27.3	0	-	0	-
Data Processing	106	11	10.4	25	23.6	4	3.8	62	58.5	2	1.9	2	1.9
Electrical	106	10	9.4	44	41.5	2	1.9	50	47.2	0	-	0	-
Mechanical	96	5	5.2	48	50.0	5	5.2	35	36.5	3	3.1	0	-
Civil	51	4	7.8	25	49.0	5	9.8	17	33.3	0	-	0	-
Tool	50	4	8.0	17	34.0	1	2.0	27	54.0	1	2.0	0	-
Electro-Mechanical	7	1	14.3	1	14.3	1	14.3	3	42.9	1	14.3	0	-
Metallurgical	14	1	7.1	6	42.9	0	-	7	50.0	0	-	0	-
TOTAL	463	37	8.0	188	40.6	19	4.1	210	45.4	7	1.5	2	0.4

* Source - Graduate Follow-Up, Connecticut State Department of Education

** Percentage of Graduates

NOTE: Percentage detail may not total 100.0 because of rounding.

TABLE IX-10

1968 STATE

TECHNICAL COLLEGE GRADUATES ENTERING TECHNICAL PROFESSIONS *

AREA	TOTAL GRADUATES	ENTERED ARMED FORCES		CONTINUED TRAINING FULL-TIME		OTHER OR UNKNOWN STATUS		EMPLOYED AS TECHNICIAN		EMPLOYED NOT TECHNICIANS		PART-TIME OR UNEMPLOYED	
		#	%**	#	%**	#	%**	#	%**	#	%**	#	%**
Chemical	31	4	12.9	9	29.0	2	6.4	16	51.6	0	-	0	-
Data Processing	87	9	10.3	31	35.6	5	5.7	41	47.1	0	-	1	1.1
Electrical	109	15	13.8	34	31.2	6	5.5	54	49.5	0	-	0	-
Mechanical	103	9	8.7	50	48.5	3	2.9	40	38.8	1	1.0	0	-
Civil	28	2	7.1	14	50.0	0	-	12	42.8	0	-	0	-
Tool	51	6	11.8	20	39.2	2	3.9	23	45.1	0	-	0	-
Electro-Mechanical	9	0	-	3	33.3	0	-	6	66.7	0	-	0	-
Metallurgical	28	4	14.3	9	32.1	5	17.8	10	35.7	0	-	0	-
TOTAL	446	49	11.0	170	38.1	23	5.2	202	45.3	1	0.2	1	0.2

* Source - Graduate Follow-Up, Connecticut State Department of Education

** Percentage of Graduates

NOTE: Percentage detail may not total 100.0 because of rounding.

TABLE IX-11

1967 STATE
TECHNICAL COLLEGE GRADUATES ENTERING TECHNICAL PROFESSIONS *

AREA	TOTAL GRADUATES	ENTERED ARMED FORCES		CONTINUED TRAINING FULL-TIME		OTHER OR UNKNOWN STATUS		EMPLOYED AS TECHNICIAN		EMPLOYED NOT TECHNICIANS		PART-TIME OR UNEMPLOYED	
		#	%**	#	%**	#	%**	#	%**	#	%**	#	%**
Chemical	34	1	2.9	10	29.4	5	14.7	18	53.0	0	-	0	-
Data Processing	74	6	8.1	18	24.3	8	10.8	40	54.0	2	2.7	0	-
Electrical	110	7	6.4	36	32.7	8	7.3	58	52.7	1	0.9	0	-
Mechanical	95	5	5.3	39	41.0	0	-	51	53.7	0	-	0	-
Civil	21	4	19.0	6	28.6	0	-	11	52.4	0	-	0	-
Tool	59	6	10.2	7	11.9	3	-	42	71.2	1	1.7	0	-
Electro-Mechanical	13	0	-	3	23.1	0	-	10	76.9	0	-	0	-
Metallurgical	9	1	11.1	2	22.2	2	22.2	4	44.4	0	-	0	-
TOTAL	415	30	7.2	121	29.2	26	6.3	234	56.4	4	1.0	0	-

* Source - Graduate Follow-Up, Connecticut State Department of Education

** Percentage of Graduates

NOTE: Percentage detail may not total 100.0 because of rounding.

TABLE IX-12

1966 STATE

TECHNICAL COLLEGE GRADUATES ENTERING TECHNICAL PROFESSIONS *

AREA	TOTAL GRADUATES	ENTERED ARMED FORCES		CONTINUED TRAINING FULL-TIME		OTHER OR UNKNOWN STATUS		EMPLOYED AS TECHNICIAN		EMPLOYED NOT TECHNICIANS		PART-TIME OR UNEMPLOYED	
		#	%**	#	%**	#	%**	#	%**	#	%**	#	%**
Chemical	28	2	7.1	7	25.0	0	-	18	64.2	0	-	1	3.6
Data Processing	50	6	12.0	18	36.0	1	2.0	24	48.0	0	-	1	2.0
Electrical	36	6	7.6	23	29.1	0	-	2	2.5	2	2.5	3	3.8
Mechanical	86	4	4.6	29	33.7	0	-	51	59.3	1	1.1	1	1.1
Civil	28	2	7.1	6	21.4	0	-	20	71.4	0	-	0	-
Tool	47	3	6.4	4	8.5	0	-	38	80.8	0	-	2	4.2
Electro-Mechanical	19	3	15.8	4	21.0	2	10.5	10	52.6	0	-	0	-
Metallurgical	15	0	-	4	26.7	0	-	11	73.3	0	-	0	-
TOTAL	309	26	8.4	95	30.7	3	1.0	174	56.3	3	1.0	8	2.6

* Source - Graduate Follow-Up, Connecticut State Department of Education

** Percentage of Graduates

NOTE: Percentage detail may not total 100.0 because of rounding.

TABLE IX-13

X. RECOMMENDATIONS

In the opinion of the authors of this report, projections of supply and demand for higher-educated manpower in a moderately-sized State like Connecticut probably cannot be developed much further than those herewith in terms of comprehensiveness or sophistication. This conclusion is a recognition of the lack of data and information-processing channels currently available.

Of first priority for expansion of this research is the development of an empirically-derived education/occupation matrix. Such a matrix, if developed on a national level, could be coordinated with the existing industry/occupation matrix. This i/o matrix has been in turn coordinated with a national econometric model. Such a development would make known the projected effects of macro-economic developments on the market for manpower possessing a given degree of education. (A more detailed discussion of matrices may be found in Chapter III).

In order to assess all aspects of the supply and demand of educated manpower in a State or region, further development of migration and mobility data is essential. Geographically, this data must be developed for the States and regions as well as for the Standard Metropolitan Statistical Areas. Demographically, this data should ideally be developed for occupation at the detail of the D.O.T. three-digit categories and not simply for the ten socio-economic categories utilized by the Census Bureau. (Further information on mobility and migration is included in Chapter V).

Regardless of the implementation of the above projects, all levels

and branches of government should endeavor to standardize their occupational data and discussions according to the Dictionary of Occupational Titles and their educational data and discussions according to the Higher Education General Information Survey format. All such data should be assembled in such a manner as to maximize the possiblities for partial and complete aggregation and disaggregation. (Chapters III and IV discuss the various classification systems for occupational and educational data.)

Federal agencies who might potentially be interested in the development of an education/occupation matrix include the U.S. Department of Labor's Manpower Administration, the U.S. Department of Commerce, and the Office of Education.

Although it would appear that further internships of this type on a state-by-state basis will face similar constraints, two avenues for utilizing interns to develop supply/demand data for educated manpower might be possible. One suggestion would be to have a team of several interns tour the various States with NEBHE's constituency in order to ascertain the level of data available in each state. A second suggestion would be that a group of interns might study one axis of the matrix, such as the economic interrelationships between the New England States as they affect demand in occupations. Again, we feel that a development of statistically sampled education/occupation matrix is essential to further studies of this type. An almost limitless number of projects could follow in the wake of such an education/occupation matrix.

To the Connecticut Commission for Higher Education, we recommend a revision of the Report on New Program Plans as discussed in Chapter VII

and exemplified in Appendix VIII-C. Hopefully, such a revised questionnaire would provide standardized data for input into the proposed management information system. Conducting such a survey every three years for a five-year outlook would probably allow a reasonably current indication of institutions' thinking as well as an empirical evaluation of the efficacy of such thinking along the lines of Appendix VIII-A, "A Review of Memorandum #5."

A system-wide follow-up survey of graduates of the nature of the surveys discussed in Chapter IX would be invaluable for assessing the relationship between the State's inputs and outputs in higher education. The surveys, conducted by HEGIS and D.O.T. educational and occupational classifications, would indicate how expansion of various curriculum areas would affect the States' labor market. Such an indication would be invaluable to the State's education planners by providing an assessment of the employment opportunities for graduates of various curricula.

The implementation of the above data collection is fundamental to the Commission's assessment of higher-educated manpower supply and demand. The use of data-processing technology would maximize the versatility of such raw data, of course. Full cooperation of the various institutions in the State is necessary if the data collected is to be used for comparative and analytical purposes, of course. In the long-run, the dissemination of such information probably will be of most value to the institutions themselves.

CHAPTER XI

SELECTED ANNOTATED BIBLIOGRAPHY

I. GOVERNMENT DOCUMENTS AND REPORTS -- NATIONAL

U.S. Department of Health, Education and Welfare. Office of Education. National Center for Educational Statistics. Projections of Educational Statistics to 1979-80. OE-10030-70. Washington: G.P.O., 1970 Issued Annually.

Basic Federal source book for educational projections; includes graphics and historical data.

U.S. Department of Health, Education and Welfare. Office of Education. National Center for Educational Statistics. A Taxonomy of Instructional Programs in Higher Education. OE-50064. Washington: G.P.O., 1970.

A sophisticated, comprehensive, and flexible means for classification of academic programs in higher education; separates two-year programs from those at the Baccalaureate level and above; an essential tool for presenting the supply side of the education/occupation relationship.

U.S. Department of Health, Education and Welfare. Public Health Service. National Institutes of Health. Health Manpower Source Book: Section 2, Allied Health Manpower, 1950-1980, by Maryland Y. Pennell and David P.Hoover. Washington: G.P.O., 1970

Includes useful national data on both educational and occupational aspects of health paraprofessionals; useful in establishing an interface.

U.S. Department of Labor. U.S. Manpower in the 1970's. Washington: G.P.O., 1970.

Simplified graphical presentations of historical and projected manpower data; particularly useful for presentations to the uninitiated.

U.S. Department of Labor. Bureau of Labor Statistics. College Educated Workers, 1968-80: A Study of Supply and Demand. Bulletin 1676. Washington: G.P.O., 1970.

The Basic Labor Department Study involving highly educated manpower; however, it often fails to quantify the supply side of the relationship to its most useful extent, occupational breakdown is not adequate and compositions of the categories are often uncertain.

U.S. Department of Labor. Bureau of Labor Statistics, Occupational Employment Statistics, 1960-67. Bulletin 1643. Washington: G.P.O., 1970.

Part of the data necessary for a national industry-occupation matrix; helpful in ascertaining trends in occupational demand.

U.S. Department of Labor. Bureau of Labor Statistics. Occupational Outlook for College Graduates, 1970-71 Edition. Bulletin 1681. Washington: G.P.O., 1971.

Reprints of portions of the Occupational Outlook Handbook (BLS Bulletin 1650) that pertains to occupations requiring higher education; intended for guidance use and thus highly verbal, this publication is useful in outlining job qualifications and definitions and also in providing some quantitative data.

U.S. Department of Labor. Bureau of Labor Statistics. Ph.D. Scientists and Engineers in Private Industry, 1968-80. Bulletin 1648. Washington: G.P.O., 1970.

A brief qualitative report based on questionnaires sent to various firms throughout the nation; includes some quantitative data.

U.S. Department of Labor. Bureau of Labor Statistics. Technician Manpower 1966-80. Bulletin 1639. Washington: G.P.O., 1970.

A thorough demand analysis for technicians; includes a substantial methodological digression entitled "Directions for Future Research," outlining data gaps.

U.S. Department of Labor. Bureau of Labor Statistics. Tomorrow's Manpower Needs: National Manpower Projections and a Guide to Their Use as a Tool in Developing State and Area Manpower Projections. Bulletin 1606. Washington: G.P.O., 1969.

The basic industry/occupation matrix utilized by the Federal government; contains data relevant to exogenous influences on the labor force.

U.S. Department of Labor. Bureau of Labor Statistics. The U.S. Economy in 1980. Bulletin 1673. Washington: G.P.O., 1970.

Comprehensive survey of generally macro-economic projections; portions are similar in format to the Economic Report of the President.

U.S. Department of Labor. Manpower Administration. Dictionary of Occupational Titles, 3rd ed. Washington: G.P.O., 1965.

Essential tool for defining occupations for use in supply/demand analysis and projections.

U.S. Department of Labor. Manpower Administration. Manpower Projections: An Appraisal and a Plan of Action. Washington: G.P.O., 1967.

Discusses data gathering methods as well as those used in projecting manpower demands; outlines data gaps.

U.S. Department of Labor. Manpower Administration. Occupational Licensing and the Supply of Nonprofessional Manpower. Manpower Research Monograph No. 11. Washington: G.P.O., 1969.

Essentially a compendium of licensed occupations in the fifty states, this report provides a basis from which gathering supply and demand data for occupations with higher educational requirements might be facilitated.

U.S. Department of Labor. Manpower Administration. Bureau of Employment Security. U.S. Employment Service. Prospective Occupations for Liberal Arts and Science Graduates. 1966.
Relates undergraduate curriculum areas to prospective occupations by Dictionary of Occupational Title Classifications; does not consider supply and demand.

U.S. Department of Labor. Manpower Administration. U.S. Training and Employment Service. Conversion Table: Bureau of the Census-Dictionary of Occupational Titles. 1970.
An essential document if standardization of various Federal occupational data is desired; an alternative occupational classification system to the D.O.T.

II. GOVERNMENT DOCUMENTS AND REPORTS -- CONNECTICUT

Connecticut. Commission for Higher Education. Degree Programs in Connecticut's Institutions of Higher Education 1969-1970. Hartford, 1969.
An inventory, cross-listed by institution and old HEGIS category.

Connecticut. Commission for Higher Education. An Estimate of the Total Full Time Undergraduate College Population of Connecticut Residents and a Projection of Enrollments for Higher Education in Connecticut Based upon this Estimate, by Francis J. Degnan. Hartford, 1970.
A methodically developed projection, including data for individual institutions.

Connecticut. Commission for Higher Education. Occupational Projections for Connecticut: A Survey of Existing Information, by Micheal B. Krok. Staff Paper. Hartford, 1968.
A pilot survey reviewing the problems facing supply/demand analysis on the state level; includes bibliography.

Connecticut. Commission for Higher Education. Higher Education Annual Enrollment Survey. Hartford, 1967. Issued Annually.
Assembled from HEGIS questionnaire, this publication graphically and arithmetically outlines enrollment and degree data, along with other areas.

Connecticut. Commission for Higher Education. New Programs Planned By Institutions of Higher Education in the State of Connecticut 1968-1972. Unpublished draft. Hartford, 1968.
Summary of Memorandum #5, asking institutions their academic plans.

Connecticut. Commission for Higher Education. Projected Industry and Employment Trends in Connecticut, by Michael P. Krok. Staff Paper. Hartford, 1968.
A survey of the Connecticut economy with specific emphasis on its relationship to educational system inputs.

Connecticut. Interregional Planning Program. The Socio-Economic Growth Model, by John M. Thompson, Jr., Staff Paper. Hartford, c. 1966.
An expansion of an industry/occupation matrix; could be a basis for comprehensive state-wide manpower demand projections.

Connecticut. Labor Department, Employment Security Division. Occupational Outlook 1968-1975. Hartford, c. 1970.
A demand analysis, giving demand by Census Bureau occupational categories for 1960, 1968, and 1975; a narrative is included.

Connecticut Research Commission. Demand and Supply: Industrial Research Technicians in Connecticut 1969-1975, by H. Bandes. Hartford, 1969.
Qualitative and quantitative study outlining technician employment in the State; relates educational attainment to specific employment.

Connecticut. Research Commission. The Non-Completer in the Connecticut State Technical Colleges' Class of 1968, by H. Bandes. Hartford, 1969.
Interesting report which outlines phenomenon of technicians with one year of training filling technicians' slots in the job market; this upgrading is a necessary consideration in a supply/demand analysis as an index of gap.

Connecticut. State Department of Education, Division of Vocational Education. Graduate Follow Up: Statistical Data on Connecticut Students Completing Vocational Programs in 19--. Hartford, Issued Annually.
Statistically traces the employment obtained by graduates of technical and vocational programs throughout the state, including post secondary programs such as the State Technical Colleges. (Note: Since this report is required for Federal funding of these programs, similar reports are probably available for every State.)

Connecticut. State Department of Education, Division of Vocational Education. Health Service Occupations: Occupational Needs, Educational Requirements, by David Pinsky et al. Hartford, 1967.
An adequate survey of all allied health fields, with regional health needs outlined numerically by the various professions.

Connecticut. State Department of Health. Inactive Health Project: Final Quarterly Progress Report, August 31, 1970, by Norma Lundquist and Barbara McCarragher.
An interesting and thorough follow-up survey of Registered Nurses, Dental Hygienists, Dietitians and Social Workers, revealing the employment constraints upon a (female) secondary labor force.

Little, Arthur D., Inc. An Assessment and Projection of the Resources and Needs of Independent Higher Education in Connecticut. Report to the Connecticut Commission for Higher Education, 1971
Includes projections of independent colleges' enrollments and degree awards as well as profiles of colleges at present.

Little, Arthur D., Inc. Needs for Higher Education Related to Regional and Statewide Economic Development in Connecticut. Report to the Connecticut Commission for Higher Education, 1971

Has a heavy orientation to social needs as opposed to economic demand; contains a good number of summaries of educational and regional economic data throughout the State.

Malsbary, Dean R. An Introductory Study of School Leavers from the Business Program in the Community Colleges of Connecticut. Storrs: Department of Higher, Technical Adult Education, The School of Education, The University of Connecticut, 1970.

Based on a questionnaire sent to graduates and non-graduates, the study indicates the occupations in which students in a narrow spectrum of higher education find employment; provides some elementary data for an interface.

University of Connecticut. Labor Education Center. The Need for Technicians in Connecticut. Storrs, Connecticut: c. 1970

Although a "needs" analysis, this report is close in accuracy to a demand analysis because the strong social considerations that exaggerate (e.g.) allied health "needs" as opposed to "demand" are not present in a discussion of industrial technicians.

University of Connecticut. School of Engineering and Labor Education Center, joint project. Connecticut Metalworking: The Decade Ahead. Storrs, Connecticut: c. 1969

Includes discussion of occupations which require higher education within the metallurgical field.

III. GOVERNMENT DOCUMENTS AND REPORTS -- OTHER LESS-THAN-NATIONAL

Hamovitch, William and Levenson, Albert M. Projected Employment and Occupational Mix: Nassau-Suffolk 1970-85. Hempstead, N.Y.: Hofstra University Center for Business and Urban Research, 1968

Provides the basis for demand data utilized in Levenson's supply/demand analysis (see below).

Lawrence, Ben; Weathersby, George; and Patterson, Virginia W. Outputs of Higher Education: Their Identification, Measurement, and Evaluation. Boulder, Colo.: Western Interstate Commission for Higher Education, 1970

A sometimes successful attempt to bridge the gap between the philosophy of cost/benefit analysis and the philosophy of education as of intangible benefit; the nature of the presentation is somewhat too popularized to be used in research.

Lee, Everett S., and Rhee, Jong Mo. Migration to the New England States. Wellesley, Mass.: New England Board of Higher Education, 1969

Based on 1969 census data, this report relates migration to educational achievement; data is broken down by State; a necessary component of any ideal education/occupation matrix at the less-than-national level.

Levenson, Albert M. Manpower Supply and Demand in Nassau-Suffolk 1965-75. Hempstead, N.Y.: Hofstra University Center for Business and Urban Research, 1970

Accounting for all levels of education, this is perhaps the only comprehensive supply/demand analysis of education and manpower completed on a less-than-national level.

Pennsylvania. Department of Community Affairs, Manpower in Pennsylvania, by Louis T. Harms and Rosella James. Volume I, Methodological Statement; Volume II, Projections to 1980. Harrisburg, Penn.: 1967

An expansion of an industry/occupation matrix to provide a county-by-county breakdown of anticipated demand.

U.S. Department of Labor. Bureau of Labor Statistics. Employment Outlook for 1971 College Graduates. Regional Report No. 71-4. Boston, 1971

Short, qualitative report concerning employment difficulties and opportunities in selected industries throughout New England; lacks comprehensive quantitative data.

Watson, Donald A. An Input-Output Model for State Manpower Projections. Eugene, Oregon: University of Oregon Bureau of Business and Economic Research, 1970

Results of a study funder by the Manpower Administration which outlines development of an industry/occupation matrix on a state level; concludes that sample of only a State's largest industries can guide entire matrix.

IV. BOOKS, GENERAL

Becker, Gary S. Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. New York: National Bureau of Economic Research, 1964

The classic work establishing education as an investment which repays the individual in terms of higher earnings and wealth.

Berg, Ivar. Education and Jobs: The Great Training Robbery. New York: Prager, 1970

An irreverent look at the purported educational requirements generally held necessary for success in a number of occupations; more quantification would have been useful; should be valuable in interfacing education and occupation.

Caffrey, John, ed. The Future Academic Community: Continuity and Change. Washington, D.C.: American Council on Education, 1969

A collection of essays oriented to the generalist and educationalist; sections on "The Financing of Higher Education" and "Managing the Future" introduce the reader to some current thoughts relevant to a supply/demand outlook on education.

Davis, Russell G. Planning Human Resource Development: Educational Models and Schemata. Chicago: Rand McNally & Co., 1966
Excellent and quite readable survey of quantitative approaches to educational impact; considers all levels of education; particularly concerned with planning impact of educational planning on underdeveloped countries.

Eurich, Alvin C., ed., Campus 1980: The Shape of the Future in American Higher Education. New York: Delacorte Press, 1968
A very general collection of essays; readings such as that on the community college introduce the reader to some of the conflicts of interest inherent in education planning.

Folger, John K., Astin, Helen S.: and Bayer, Alan E. Human Resources and Higher Education. New York: Russel Sage Foundation, 1970
Comprehensive, current, though slightly disjointed overview; a fine collection of statistics is included throughout; as a result of many individuals' work over a number of years, this volume is an essential basis for relating occupations to higher education.

Greenfield, Harry I. Allied Health Manpower: Trends and Prospects. New York: Columbia University Press, 1969
Comprehensive overview of the pregnant field of health paraprofessionals; not particularly useful from a methodological viewpoint.

Kotschnig, Walter M. Unemployment in the Learned Professions. London: Oxford University Press, 1937
Valuable for both historical and international perspectives on the issue of planning for the employment of manpower supplied by higher education.

Lecht, Leonard A. Manpower Needs for National Goals in the 1970's. New York: Frederick A. Praeger, 1969
Useful overview of national needs; often more socially-oriented than economically-oriented.

Lester, Richard A. Manpower Planning in a Free Society. Princeton: Princeton University Press, 1966
Readable, generalized approach to the constraints inherent in planning and projecting manpower supply and demand; leaves a Great Society flavor with the reader.

Morton, J.E. On the Evolution of Manpower Statistics. Kalamazoo, Mich.: The W.E. Upjohn Institute for Employment Research, 1969
After a heavy dose of history, this publication provides an interesting guide to the statistical pitfalls in manpower research, as well as outlining a strategy for the gathering of needed data.

National Manpower Council. Education and Manpower, ed. by Henry David. New York, Columbia University Press, 1960

Somewhat dated but worthwhile introduction to education's macro- and micro-impacts upon the economy; Part 4 is specifically concerned with higher education.

Spaeth, Joe L., and Greeley, Andrew M. Recent Alumni and Higher Education. New York: McGraw-Hill, 1970

Essentially a sociological survey achieved via public opinion research; Chapter 9, "Higher Education and Occupational Attainment," has potential for use in manpower analysis.

Thonstad, Tore. Education and Manpower: Theoretical Models and Empirical Applications. Toronto: University of Toronto Press, 1968

An ideal theoretical and empirical consideration of relationships between education and manpower; its mathematical techniques are highly sophisticated; the example used throughout is Norway.

-----. Manpower Planning; A Research Bibliography. Bulletin 52. Minneapolis: University of Minnesota Industrial Relations Center. 1970

Major headings include: Introduction to Manpower Planning, Aggregate Manpower Planning, Disaggregate Manpower Planning, Foreign Manpower Planning, Manpower Planning in the Firm, Productivity and Technological Change; Miscellaneous.

U.S. Department of Health, Education and Welfare. Office of Education. Manpower Research Inventory for Fiscal Year 19--. Washington; G.P.O., Issued Annually

A publication of the Educational Resources Information Center (ERIC); a computer print-out by topic of research studies which generally are not indexed elsewhere.

U.S. Department of Labor. Manpower Administraiton. Manpower Research Projects Sponsored by the U.S. Department of Labor, Manpower Administration, through June 30, 19--. Issued annually in Fall

Provides a bibliographic guide to projects in progress as well as those completed; provides names and addresses of researchers as well as listing libraries, government offices, and other sources of published information.

VI. MISCELLANEOUS

American Council on Education. A Fact Book on Higher Education. Issued Four Times Annually.

Collects existing data with annual revisions; includes graphics.

Cartter, Allan M. "Scientific Manpower for 1970-1985." Science, 172 (9April 1971) 132-140.

A look in the present and future drop in the demand for Ph.D.'s in the sciences; Cartter states that his iconoclasm of ten years ago has been conformed by demographic and economic developments.

CHAPTER XII

INTERVIEWS WITH RESOURCE PERSONS

June 14	Mr. Dennis Little, Institute for the Future, Middletown
June 24	Mr. Kapriel Kaprielian, Labor Research Supervisor, State Labor Department, Wethersfield.
June 28	Dr. Edwin L. Caldwell, Vice President and Economist, Connecticut Bank and Trust Company, Hartford.
June 29	Mr. Bradford S. Chase, Principal Planning Coordinator, Office of State Planning, Hartford.
July 1	Dr. Bernard D. Shea, Associate Executive Officer for Academic Affairs, Board of Trustees for Regional Community Colleges, Hartford.
July 6	Mr. Edward M. Butler, Office of State Planning, Hartford.
July 8	Mr. John Glynn, Director and Extensions Professor; Mr. David Pinsky, Extension Professor; Mr. William J. Flood, Research Assistant - Labor Education Center, University of Connecticut, Storrs.
	Mr. Giles A. Packer, Administrative Assistant, Placement Office, University of Connecticut, Storrs.
	Dr. William C. Orr, Associate Provost, University of Connecticut, Storrs.
July 9	Mr. Ralph W. Bess, Director of Testing and Institutional Research, Norwalk Community College.
	Mr. Peter I. O'Hara, Director of Admissions, Norwalk Community College.
July 23	Mr. Lucian L. Lombardi, Director, Board of Trustees for State Technical Colleges, Hartford.
July 28	Dr. Claire Reinhardt, State Department of Education, Division of Vocational Training, Hartford.
July 30	Dr. Joseph R. Dunn, Director of Institutional Research, Central Connecticut State College, New Britain.

CONNECTICUT PUBLIC SYSTEM	FULL-TIME UNDERGRADUATE			FULL-TIME GRADUATE			PART-TIME UNDERGRADUATE			PART-TIME GRADUATE			Unclassified Students	Total Enrollment
	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total		
University of Connecticut														
Storrs, Main Campus	6,321	4,982	11,303	1,657	741	2,398	53	69	122	1,433	378	1,811	854	16,488
Groton	248	157	405	-	-	-	9	13	22	-	-	-	109	536
Hartford	521	290	811	-	-	-	56	49	105	-	-	-	220	1,136
Stamford	273	165	438	-	-	-	18	27	45	-	-	-	130	613
Torrington	170	74	244	-	-	-	6	11	17	-	-	-	66	327
Waterbury	460	242	702	-	-	-	10	14	24	-	-	-	62	788
University of Connecticut - Health Center	-	-	-	130	11	141	-	-	-	-	-	-	-	141
SUB-TOTAL	7,993	5,910	13,903	1,787	752	2,539	152	183	335	1,433	378	1,811	1,441	20,029
State Colleges														
Central Connecticut	3,761	3,383	7,144	73	111	184	1,491	1,130	2,621	976	1,571	2,547	-	12,496
Eastern Connecticut	575	982	1,557	6	10	16	191	274	465	102	317	419	-	2,457
Southern Connecticut	2,379	4,467	6,846	160	246	406	596	1,169	1,765	1,275	2,221	3,496	-	12,513
Western Connecticut	934	1,520	2,454	10	21	31	246	356	602	332	670	1,002	-	4,089
SUB-TOTAL	7,649	10,352	18,001	249	388	637	2,524	2,929	5,453	2,685	4,779	7,464	-	31,555
Regional Community Colleges														
Greater Hartford	746	334	1,080	-	-	-	195	184	379	-	-	-	-	1,459
Housatonic	757	527	1,284	-	-	-	545	330	875	-	-	-	30	2,189
Manchester	1,006	508	1,514	-	-	-	740	428	1,168	-	-	-	-	2,682
Mattatuck	797	371	1,168	-	-	-	236	420	656	-	-	-	-	1,824
Middlesex	617	338	955	-	-	-	210	257	467	-	-	-	-	1,422
Mohegan	208	103	311	-	-	-	46	101	147	-	-	-	-	458
Northwestern Connecticut	657	263	920	-	-	-	152	183	335	-	-	-	-	1,255
Norwalk	1,070	319	1,389	-	-	-	794	493	1,287	-	-	-	-	2,676
South Central	652	300	952	-	-	-	145	252	397	-	-	-	-	1,349
Tunxis	198	85	283	-	-	-	116	100	216	-	-	-	-	499
SUB-TOTAL	6,708	3,148	9,856	-	-	-	3,179	2,748	5,927	-	-	-	30	15,813
State Technical Colleges														
Hartford	605	33	638	-	-	-	1,015	15	1,030	-	-	-	-	1,668
Norwalk	682	29	711	-	-	-	1,371	75	1,446	-	-	-	-	2,157
Thames Valley	489	42	531	-	-	-	456	90	546	-	-	-	-	1,077
Waterbury	572	39	611	-	-	-	870	70	940	-	-	-	-	1,551
SUB-TOTAL	2,348	143	2,491	-	-	-	3,712	250	3,962	-	-	-	-	6,453
Total Public System	24,698	19,553	44,251	2,036	1,140	3,176	9,567	6,110	15,677	4,118	5,157	9,275	1,471	73,850
SUPPORTED BY FEDERAL GOV'T.														
U.S. Coast Guard Academy	969	-	969	-	-	-	-	-	-	-	-	-	-	969
Total, Publicly Supported	25,667	19,553	45,220	2,036	1,140	3,176	9,567	6,110	15,677	4,118	5,157	9,275	1,471	74,819
Total, Independent Colleges (from Table 1A)	18,330	10,300	28,630	4,082	1,252	5,334	4,213	2,782	6,995	4,417	2,710	7,127	3,775	51,861
GRAND TOTAL	43,997	29,853	73,850	6,118	2,392	8,510	13,780	8,892	22,672	8,535	7,867	16,402	5,246	126,680

CHAPTER XIII

INSTITUTIONS OF HIGHER EDUCATION IN CONNECTICUT - Opening Fall Enrollments, 1970 - Number of Students, by Level, in all Programs

INDEPENDENT COLLEGES

FOUR YEAR COLLEGES AND UNIVERSITIES	FULL-TIME UNDERGRADUATE			FULL-TIME GRADUATE			PART-TIME UNDERGRADUATE			PART-TIME GRADUATE			Unclassified Students	Total Enrollment
	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total		
Albertus Magnus	-	535	535	-	-	-	-	-	-	-	-	-	14	549
Annhurst	-	408	408	-	-	-	-	27	27	-	-	-	21	456
Berkeley Divinity	-	-	-	61	2	63	-	-	-	7	-	7	-	70
Bridgeport Engineering	-	-	-	-	-	-	545	2	547	-	-	-	-	547
College of Notre Dame	-	5	5	-	-	-	-	30	30	-	-	-	-	35
Connecticut College	152	1,348	1,500	17	14	31	-	6	6	10	18	28	200	1,765
Fairfield	1,870	228	2,098	89	33	122	-	-	-	606	774	1,380	15	3,615
Hartford Sem. Found.	-	-	-	150	19	169	-	-	-	24	3	27	45	241
Holy Apostles Seminary	72	-	72	3	-	3	-	-	-	-	-	-	-	75
New England Institute	-	-	-	3	-	3	-	-	-	-	-	-	-	3
Quinnipiac	1,452	772	2,224	-	1	1	213	103	316	1	1	2	393	2,936
RPI of Connecticut	-	-	-	-	-	-	-	-	-	631	13	644	-	644
Sacred Heart	934	586	1,520	-	-	-	-	-	-	-	-	-	554	2,074
St. Alphonsus	63	-	63	-	-	-	-	-	-	-	-	-	-	63
St. Basil's	24	-	24	-	-	-	-	-	-	-	-	-	-	24
St. Joseph	-	467	467	1	14	15	1	6	7	100	239	339	67	895
Trinity	1,094	393	1,487	11	7	18	2	4	6	267	163	430	27	1,968
Univ. of Bridgeport	2,361	2,056	4,417	177	90	267	1,069	786	1,855	1,207	780	1,987	370	8,896
Univ. of Hartford	2,082	1,584	3,666	190	94	284	1,877	1,397	3,274	1,142	639	1,781	-	9,005
Univ. of New Haven	2,106	255	2,361	35	-	35	51	15	66	312	3	315	1,936	4,713
Wesleyan	1,217	176	1,393	69	50	119	-	-	-	110	77	187	118	1,817
Yale	3,954	769	4,723	3,276	928	4,204	-	-	-	-	-	-	-	8,927
SUB-TOTAL	17,381	9,582	26,963	4,082	1,252	5,334	3,758	2,376	6,134	4,417	2,710	7,127	3,760	49,318
TWO YEAR COLLEGES														
Hartford College for Women	-	190	190	-	-	-	-	36	36	-	-	-	-	226
Longview	4	9	13	-	-	-	1	22	23	-	-	-	-	36
Mitchell	454	202	656	-	-	-	378	284	662	-	-	-	-	1,318
Mt. Sacred Heart	-	19	19	-	-	-	-	7	7	-	-	-	-	26
Post Junior	322	226	548	-	-	-	72	47	119	-	-	-	-	667
Silvermine College of Art	102	72	174	-	-	-	4	10	14	-	-	-	15	203
St. Thomas Seminary	67	-	67	-	-	-	-	-	-	-	-	-	-	67
SUB-TOTAL	949	718	1,667	-	-	-	455	406	861	-	-	-	15	2,543
Total, Independent Colleges	18,330	10,300	28,630	4,082	1,252	5,334	4,213	2,782	6,995	4,417	2,710	7,127	3,775	51,861
Total, Publicly Supported (from Table 1B)	25,667	19,553	45,220	2,036	1,140	3,176	9,567	6,110	15,677	4,118	5,157	9,275	1,471	74,819
GRAND TOTAL	43,997	29,853	73,850	6,118	2,392	8,510	13,780	8,892	22,672	8,535	7,867	16,402	5,246	126,680